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INTERACTIVE STORY TELLING PACKAGE FOR CHILDREN (BAHASA MALAYSIA VERSION)

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ABSTRACT

Interactive Multimedia Storytelling Package is an interactive educational storytelling CD-ROM in Bahasa Malaysia meant for children aged 4 to 7 years old. It comprises of an interesting story suitable for preschools and can be a beneficial teaching tool for parents and teachers in educating the young children. The story is written in simple Bahasa Malaysia to make it easier and comprehensible to local children. The story narrated aims to give them a lesson on humanity and morality, with the characters playing a big role in influencing the children's characteristics.

To keep the children entertained as well as educated, this package also comprises games and activities to stimulate them intellectually. The activities incorporated are carefully selected in order to give the best experience to the children. The story includes activities such as colouring, counting and objects identifying which will help the children develop positive attitude and enhance their decision making and analytical skills. Director 7.0 is the software chosen to develop this programme.

ACKNOWLEDGEMENTS

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Much of this project contains technical and non-technical information gathered from dozens of different sources. This process has involved many people who gave great assistance to the completion of this project such as staffs of University of Malaya , teachers of kindergartens and parents for their suggestions and assistance.

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CHAPTER 1

INTRODUCTION

CHAPTER 1 : INTRODUCTION

.1 Introduction to Interactive Storytelling package.

A large number of the CD-ROM titles are designed for entertainment for both young and old. There are titles for games, music, opera, art, education and a large variety of other subjects. Many of the titles are both educational as well as entertaining (Pilgrim,1994).

In the training environment, the interactive multimedia approach is seen as a natural way to learn because it involves the student individually through sight, sound and touch, if necessary. This individual involvement with an interactive multimedia knowledge base with associated scoring, testing, and progress reports is believed to enhance the knowledge absorption and retention rate which is the main objective of all training programs.

Interactive Storytelling package for children is a multimedia based courseware developed to intensify the education for children especially for those in kindergarten. Being part of educational tool, it is developed solely to enhance a step further the level of learning by listening to stories in CD-ROM together with activities included to let them enjoy while learning.

The development of this project involves the combination of text, graphics, sound and animation to deliver information in the most effective way. Children can listen to the stories and play with the games included to keep them entertained, interested and intellectually stimulated.

1.2 Aims of the project

One of the channel for information input is through the brain. The more avenues used to input information to our brain, the easier it is to learn and remember. Human can learn better if sound is added to the text and they can learn even better with the addition of graphics (Pilgrim,1994).

This project aims to contribute to such a need by providing an effective teaching tool for children as part of their traditional education. Additionally, this package adds another important aspect to the mix, that is interactivity. Interactivity is the key element in defining multimedia where learning can be developed through discovery and exploration.

Bahasa Malaysia is a compulsory paper in all schools in Malaysia and students are required to do well in this paper during school examinations. Another aim for the development of this package is to assist children's learning of the Malay language at an early age. Storytelling is one of the most effective way of early language learning.

A large number of edutainment packages available in the market are written in English, which is a positive way to educate young children to a second language. However, there is a need and demand for courseware published or produced in Bahasa Malaysia. Hence, this package meet the needs of such courseware which can educate as well as entertain the youngster in the national language.

Several basic technologies are advancing rapidly, leading to the development of very powerful, cost-effective desktops that will form efficient multimedia

platforms. Almost every home is equipped with personal computers to comply with the needs to access information and to assist people with their assignments. This has paved the way for learning via computers and the need for the development of high quality courseware product.

On summary, this project aims to bring the level of education one step further by providing the most effective way of teaching and learning for preschools in order to prepare them for greater challenge in school. They will see the concept of learning things from different view, points and advance methods thus allowing them to interact with the system in giving them the sense of self-control in the learning process.

With this new way of enjoyable learning environment, teachers and parents will be able to give the most entertaining educational program to their children. The storytelling package will bring a new look to traditional method where parents read fairytales to their children before they go to bed.

1.3 Objectives

- To develop high quality courseware to facilitate the learning process through multimedia system as an alternative way to read story books.
- To do a research in the area that should be considered in building an effective interactive multimedia system.
- To study on multimedia elements and its advantages in teaching and learning especially the impact it has on children's learning method.
- To provide a friendlier environment to the present teaching methods and as a supplementary to the core curriculum supplied by schools.

- To enhance the level of effectiveness in teaching methods for younger children through the use of computer.
- To help children improve their analytical and learning skills through educational games and storytelling which is written in Bahasa Malaysia.
- To incorporate activities within the story telling mode to stimulate learning through interactivity.

1.4 Scope

This package targets children with average age from 4 to 7 years old. Younger children may be able to explore this package with the help and supervision of adults. They may find some difficulties in getting started with the package but they will be able to understand and learn it in just a matter of time.

This package not only introduce the children to a new way of learning but also helps teachers and parents in giving young children, the best education available.

1.5 Research Plan & Methods

A thorough research has been done in collecting the information needed towards the completeness of this project. These sources range from books, the internet, articles from newspapers and journals, surveys and interviews .

Interviewees are chosen from selected kindergartens with teachers as the target group. Teachers know more about the children's development as they are the ones who teach and train young children. Parents were also part of the group to ascertain children's need and in accordance to their mental and physical development stages.

1.6 Project Schedule

To ensure that this project completes on time, a planning schedule has been constructed. The planning indicates the various phases the project planned out to make sure that it will be completed successfully. Table 1.6 indicates the planning schedule.

ID	TASK NAME	JUN	JUL	AUG	SEP	OCT	NOV	DIS	JAN
1	Literature Review								
2	System Requirements								
3	System Design								
4	System Implementation								
5	System Testing								

Table 1.6 : Project Schedule

1.7 Summary

This chapter summarises the aims and objectives of this project. It also explains research methods used to obtain the information needed. Lastly, the project planning schedule is developed to help the planning development for this project.

Chapter 2 in this report comprises the literature review which includes the definition of multimedia and also an introduction to interactive multimedia. There are also researches and analysis on existing packages.

Chapter 3 is the system requirements and analysis which explains about the methodology used to build the system. It also comprises methods used to gather the information needed. Analysis on authoring tools is also included in order to show comparison between each authoring tool.

Lastly, Chapter 4 explains about system design which shows conceptual design of the interface as well as flowcharts indicating the flow of each module.

CHAPTER 2

LITERATURE REVIEW

CHAPTER 2 : LITERATURE REVIEW

1 Introduction to Multimedia

Various media types, such as graphics, photos, animation, sound, video and text e valuable, if not essential aids in teaching. When these are integrated into an teractive format on a personal computer they constitute multimedia, providing a rich arning environment for learners (Levin, 1993).

Multimedia tools are designed with the specific purpose of integrating various edia in presentation or production and building interactive applications. These tools are ften graphically based or object oriented. Some development environments are icon-ased allowing click-and-drag construction, while others use a combination of objects nd scripting language (Vilamil-Casanova & Louis,1996).

The spectrum of multimedia development tools can be further subdivide into three ypical multimedia application areas:

Text-Based Application

Many multimedia applications provide efficient navigation through a large resource of rimarily text-based information. These applications need to be searchable so that elevant information can be found easily and quickly.

Development tools that cater to use this type of application generally provide hypertext apabilities. Hypertext is similar to regular text, except that it contains information

nting to another point in an application. Microsoft Windows help is an example of a ertext, searching program.

Interactive Applications

e majority of multimedia applications fall into the category of interactive with phical applications. These tools are fully capable multimedia tools, which can handle media formats, as well as provide interactivity with the user. This is often desirable in education setting as it allows specific feedback to a user, keep track of results, and stomise the application to a specific feedback to user as a function of responses. though most tools provide these capabilities, some are better suited to complicated, eractive applications than others.

Wide Area Applications

new area of multimedia applications is emerging with the purpose of providing formation to an audience over a wide geographical area. This is in part being made ssible via the Internet in conjunction with new technologies composed of information ch as the World Wide Web (WWW) and Mosaic.

2 Why Multimedia Learning Style?

It is indicated in previous studies that most people retain about 20% of what they e and 30% of what they hear, but retain 50% of what they see and hear , and as much as 0% of what they see, hear and do simultaneously. The concept of CBT – which has been

xplored in academia for at least 30 years has advanced to fairly sophisticated levels and xploits interactive multimedia whenever appropriate (Szuprowicz,1994).

Besides that, according to basic principles of the psychology of learning, people etain knowledge differently because they learn in different ways. There are graphical earners, auditory learners, and kinaesthetic learners. Some people learn by reading, thers by listening, and others perhaps by looking at picture, and still others by touching bjects. That is why today more than ever, communication must be as stimulating and xciting as any of the barrage of media that pounds society daily (Levin, 1993).

.2.1 Elements of Multimedia

The various types of media must originate in some form, be it from existing hotograph, a clip from a video, or a recording of someone's voice. The process of ollecting this raw information and making it into a usable form for the multimedia-uthoring tool is the challenge of media preparation (Vilamil-Casanova & Louis,1996).

Images

)f the commonly used media types, images are the most often used to enhance the ppearance of a multimedia presentation or to add important information. Images come in variety of formats: compressed or uncompressed, bitmapped or vector, colour or grey-cale.

general, multimedia applications work with bitmapped images as opposed to vector ages. Bitmapped images are composed of many, independently drawn objects mposing an image. The most common image file types are Windows bitmaps (. BMP), vice independent bitmaps (. DIB), PC Paintbrush (. PCX), CompuServe GIF (. GIF), int Experts Photography Group (. JPG) and many more. (Vilamil-Casanova & Louis, 96)

Sound

ound can be combined in a multimedia presentation to provide information and enhance e other media being presented. There are three sound file formats but three formats are idely used: wave (. WAV), sound (. SND), and midi (. MID) files. The first two file rmats are formats used to record voice and sound effects.

he third audio type is midi (music instrument digital interface) and is used to create gital sound from midi-compatible instrument (Vilamil-Casanova & Louis, 1996).

Animation

here are two main types of animations, which are used in multimedia applications. The rst type of animation is the simple movement of objects on the screen, generally through near translation. Multimedia development environments often provide the necessary ols to perform this simple animation procedure. The original creation of animation, owever, is very technically and artistically involved, as well as time consuming Vilamil-Casanova & Louis, 1996).

Video

ıe embedding of video in multimedia applications is a powerful way to convey formation that can incorporate a personal element which other media lack. Current chnology limits digital video's speed of playback and the size of the window that can be splayed. When played back from the computer's hard disk, videos are much less smooth an conventional television images due to the hard disk data transfer rate. Often mpression techniques are used with digital video and as a result resolution is often mpromised. Also, the storage of video files requires a comparatively large amount of rd disk space (Vilamil-Casanova & Louis, 1996).

3 Computer-Based Training (CBT)

Computer-Based Training is an interactive training tool that allows me to learn a mputer application right at the desktop PC. Information is delivered to the screen, uestions are posed, and feedback on responses are received. One can navigate through e training process in a graphically enhanced environment finishing with a test that easures how much have been retained.

Computer Based Training (CBT) courses are modular, comprehensive, graphic-ch, and highly interactive. Interactive CBT requires participation from the student either y responding to the questions, completing simulation, or hands-on exercises - all ructured with the objective of providing a highly engaging learning experience.

Interactive CBT has been proven in studies to increase the rate of retention of ırning over more traditional training delivery methods. Computer-based training (CBT) ow learners to enter into an environment that they can be controlled. People learn best ıen they can take in information in the order that makes sense to them.

The face of education is dramatically changing with the addition of multiple :hnologies for learners. From books to CD-ROM to the Internet and everything in tween, technology is fast being recognized and valued by students, instructors, and ıployers. Researchers have found that in multimedia training compared with instructor-l training:

- the learning curve is 60% faster
- content retention is 25-50% higher
- learning gains are 56% higher
- variances in quality of delivery is 20-40% less

Traditional method of learning are schedule driven and other-directed. The udent takes the course when the class is scheduled, not necessarily when the skills or ıowledge are needed. Non-traditional correspondence courses offer traditional course ıntent under self-directed learning. With the accelerated pace of changing technologies, day's distance education students require an educational model that supports a self-rected approach for just-in-time learning.

Introduction to Interactive Multimedia.

Interactive multimedia simply means that users can interact with the computer h exciting graphics, animation, video and sound, to receive message in an enjoyable d memorable way. It is closely related to hypermedia which means interactive ›grams where all the information is stored in different types of media and is organized that it can be easily accessed and presented in many ways (Cotton & Oliver, 1992).

In the training environment, the interactive multimedia approach is seen as a tural way to learn because it involves the student individually through sight, sound and ıch, if necessary. This individual involvement with an interactive multimedia owledge base with associated scoring, testing and progress reports is believed to hance the knowledge absorption and retention rate which is the main objective of all ining programs (Szuprowicz,1994).

In education, interactive multimedia is acknowledged as an important solution enhance student curricula and improve educational levels. Interactive multimedia in lucation has been one of a great help as an additional teaching tool.

4.1 CD-ROM

CD-ROM (Compact Disc-Read Only Memory) is a type of Optical Storage Media ed to store data in any form such as audio, video and image. It was first created in 983 based on CD-DA (Compact Disc-Digital Audio).

CD-ROM has an amazing amount of flexibility and potential as a multimedia rage and distribution medium. One CD-ROM can hold up to 74 minutes of digital lio or 650MB of computer data which is about 464 high-density floppy disks' worth of a (Holsinger,1994).

Today there are at least four major CD standards. These standards accommodate a ndful of formats for compact disc players, interactive home entertainment systems and mputer CD-ROM systems. The audio data that is recorded onto compact discs is gital binary data, the same type of data found in computer files (Holsinger,1994).

CD-ROM is one of the fastest growing segments of the computer industry. It fers some very important benefits to the individual end-user, to education, business and dustry. CD-ROMs can engage users interactively. Users navigate information in the der that is most interesting and intuitive for them. It is also portable and flexible, people n use it anywhere they like and anytime they want.

4.2 Advantages of Interactive Multimedia CD-ROM Storybook

CD-ROM storybook allows the children to learn at their own pace, using the tools at they feel most comfortable with, such as text, graphics, video or interactive features. earners can move quickly to their preferred areas which interest them the most such as mes. It is a very flexible format.

There are several important features to include in making CD-ROMS that are both ertaining and educational and to maximize the benefits. They should ignite learning, tivate independence, accommodate a range of ages and capabilities and engage a child ually.

Ignite learning

arning seems effortless, because it is initiated by the child, allowing them to follow ir own logical trails of inquiry.

Cultivate Independence

e CD is designed suitable for children with clear instructions , but with non-linear signs acknowledging that the user is a competent decision maker and can decide for emselves what they would like to hear or see.

ildren do not like to be told what to do. They will lose their interest and attention sily by giving them loads of instructions and orders. Instead, it is better if we guide and ered them through a step by step teaching. But, it is far more effective if you let the ild take full responsibility for what they learn and in what order they learn it in which a way, acknowledge their individuality.

Range of Ages and Capabilities

lany topics are useful for many ages. It depends on how effective you want it to be for e user and how it affects the child in encouraging them to learn. The leveling does not ve to be so obvious for children level. We can incorporate leveling.

Engage a child visually

l graphics should be exciting and appropriate to the targetted ages. Graphics draw the ldren through a CD; they instinctively click on cool and attractive looking pictures just see what happens. Designs should be visual click-feast; propelling a child from one otivating graphic offering to the next until they explore every component of the CD.

Interactive Story telling Packages

Based on my research, there are variety of learning packages for preschool which very stimulating and interesting. But most of the interactive CD ROMs are in English d very few are in Bahasa Malaysia. Even though much effort has been taken to courage the usage of second language, we should not neglect the importance of Bahasa alaysia in this Information Age.

This is the advantage of this Story Telling package where all the instructions, mes and activities are written in simple Bahasa Malaysia. Learning through interactive a good start for children. It will stimulate their brains and promote fun learning .

This is a good step in educating the youngsters with different languages at the rly stage because the early years is the best years to start. The CD-ROM can corporate music, sound effects, 3D animation, high definition graphics, video and eractivity.

Children will learn faster when they there's a two-way communication between user and the learning tool. They can easily attracted to sounds and music. That is why this CD-ROM, the voice is incorporated to let the children follow the right nunciation for every word.

5 Research on Existing Packages.

5.1 Edutainment Package for Children Through Multimedia Story Telling (han Kok Shyong,1998).

This edutainment package is created for children aged between 7 to 9 years old d was developed using Visual Basic programming language based on Windows erating system. This package is quite interesting , user-friendly and easy to use as it es not require the use of the keyboard. Any interaction can be done with the click of e mouse on buttons or pictures.

It is good to know that this package is in simple Bahasa Malaysia as there are not ny story telling package in Bahasa Malaysia out in the market. This package contains different stories which can be selected according to one's favourite. The stories are erita Dongeng Aladdin", "Pakaian Baru Maharaja" and "Anak Arnab Melawan rigala".

There are short quizes with multiple answers after each story presented. The stions are short and simple but I find the answers are a bit confusing for the children. useful feature like the dictionary is also included to help the children search for anings of certain words. The text used is easy to understand and suitable for children ow 9 years of age but somehow I find that the instructions used are a bit too long . s will make the children lose their interest in reading such long and descriptive text. overcome this , they should replace some text with pictures and sounds to make it a re desirable learning tool.

There are no animation used on the characters during the story telling, which I d a bit frustrating and less amusing. There are only text below the static pictures with tain words highlighted. The definitions of the highlighted words can be found in the tionary. Children are more interested to hear stories with lots of different sounds with lourful characters and movements, this will help them stay focused and excited.

The questions in the quiz section is simple but the multiple answers are a bit nfusing . Scores will be given on each correct answer and fewer points will be ducted if the given answer is wrong. There is a bonus round if the child manage to swer all the questions correctly.

Overall, this package needs more forms of entertainment such as fun activities d games to make it more of an edutainment package. More interesting features should added in order to satisfy the needs of the children.

.2 Pakej Pembelajaran Mengenal Huruf, Bentuk, Abjad dan Warna uk Kanak-kanak 4-6 Tahun (PINTAR). (Siti Norlina, 1998)

This package is a multimedia package built using an authouring tool software ector 6.0 and can be run on Windows operating system. It is an interesting package in nasa Malaysia and is suitable for parents, teachers and children as an additional rning tool.

The system is very user-friendly with interesting and colourful objects included. ere are 4 choices on the menu once the user entered the system that is, "Menu ngenal Abjad", "Menu Mengenal Nombor", "Menu Mengenal Warna" and "Menu ngenal Bentuk" . A user can enter one of the menus at one time.

The interface is very colourful and attractively designed to attract children's ention. The numbers and letters used are big enough to cover the whole screen which somewhat eye-catching. Children can learn about letters in capital and in small capital, initial letter for each object shown, basic numbers from 1 to 10, introduction on basic lours and also shapes. Each time the user click an object, number, letter or shape, a ice can be heard clearly refering to the object. Children can repeat after the voice to rrect their pronunciation in order to learn faster, even without parental guide.

I find this package very amusing and interesting for children 4 to 6 years. It mbines all the elements in multimedia such as sound, animation and graphics. But the

ckage is too short and should be extended with more activities and games. This ckage will help children in getting to know numbers and letters, and not only that, they l also learn how to count and differentiate shapes and colours.

5.3 Fun Fusion

This is a software developed locally by Ikhlas Dunia and is designed specifically pre-schoolers aged three to seven years old. It is an educational software called Fun sion that comes in an attractive CD pack which comprises four learning programs – *onder Skool, Tod plus, Dot Time* and *Puzzle Kemp*. There is no specification on the ftware or programming language used but it can be run under Windows operating stem and also Macintosh.

The program teaches pre-school children basic learning concepts and skills in an ertaining way. It integrates serious education, exploration and recreation, all in the m of games and puzzles.

Wonder Skool teaches the alphabet, numbers, shapes, colours , fruits and getables. Tod plus gets the children to practise these skills through games such as tch The words, Fill in The Blanks and Unscramble The words. In Dot time, children dy numbers by connecting numbered dots that form a complete picture when finished, ile Puzzle Kemp teaches them about animals, birds, landmarks and transportation.

Overall, this package is worth buying and it gives me more ideas on how to elop my package. The graphics were amazing and fascinating. They have a very good a in developing games and puzzles that can attract the children's attention. I'm sure a of researches has been done in this area especially on what attracts children the most. can be proud of this package as it is developed by local software developer. Too bad y do not have anything in Bahasa Malaysia and I'm sure if they do, they will get a od response from many parents out there.

.4 I LOVE.....series (Edutainment CD-ROMs for ages 7-11)

This CD-ROM from DK Interactive Learning tries to promote healthy learning ough CD-ROMs. This CD-ROM can be run under Windows platform and also acintosh.

DK has come up with many *I Love..* titles such as *I Love Math!*, *I Love Spelling!* d *I Love Science!*. All the products are in English and it take an effective approach to goal of overcoming a child's aversion to math, science and spelling without being too l. All of them have nice touches to keep things interesting.

Even though this product is meant for kids above the age of 7, I find it very using and fun to learn it. It helps me to get some ideas in creating an interesting ckage such as this.

There are stimulated experiments, classroom exercises, game shows, which has erent levels of difficulty and also a "hint" button on every questions to help them ve along if they get stuck in answering challenging questions and games.

This product will probably work best in classrooms or other environments where child has a choice between traditional school work and playing with one of these CD-Ms.

.5 Jump Start for Preschools

I will rate this learning package from Knowledge Adventure as the best ltimedia CD-ROM I can find in the market. Knowledge Adventure is a software eloper based in United States. They are one of the award winners for best Children tware Review and Home Learning Award for children.

They not only make learning as lively and interesting as possible with varieties of nes and activities, not to forget all characters are created suitable for children of all s.

This product is a good start to promote multimedia learning for children in paration before they start schooling. Children will learn how to count by doing ivities such as helping the bear to count the ingredients he needs in making ice-cream, ing cake or even making salad. Activities to help the children identify shapes and

ects are like helping the baby elephant to keep her toys properly by putting the called ects into her trunk and also categorizing objects of the same shapes and colours in one .

Every time the children drag the mouse onto certain features such as books or nal, the cursor will change colour indicating that the object can be activated. The kage are designed with such fascinating layout that looks like a fantasy land for dren to play. There are mysteriously hidden objects everywhere but you can see it nge each time you click the mouse.

Eventhough it is rated as a number one product, I still think that for children nger than five years old may find some difficulties in using it especially for children hout English background at home. Throughout the show, a child may need some dance from adults in order optimize the functions. Also , to get them started they need dentify themselves before entering. A child may not know how to spell out their nes and too many buttons on screen makes it harder for them to choose.

Analysis

Analysis have been made based on the existing packages to consider criterias and ures that should and should not be included in this package to ensure the quality and ctiveness on the user.

The storytelling package should not be monotonous and too serious in order to act the children's attention. Even though many interactive learning package are resting and suitable for children , sometimes the instructions and stories have a dency to be too long and confusing for children to understand.

Long stories should be interrupted with games and puzzles to make it more oyable. The children will be given a choice as to whetеher they want to continue ening to the stories or venture into other games that the package has. Activities and nes included should be interesting enough to keep up with the child's interests. The vities is not merely an entertainment to the child but also it is a form of education in ancing the child's ability to learn things faster.

When it comes to educating a child, the most significant feature is simplicity. erything has to be simple yet enjoyable and attractive such as the sounds, pictures and ls used so as not to bore the child. If the learning task were thus simplified, the young ld might also develop a more positive attitude toward reading.

To promote the use of correct Bahasa Malaysia, this language is arranged in very ple sentences with clear pronunciation , not only to help the child learn the language er, but also in a more enjoyable method.

Summary

Chapter 2 defines everything about Multimedia, it's components and benefits of g Multimedia. Related to the topic is an introduction of Interactive Multimedia and use of interactive CD-ROM in storytelling. The use of CD-ROMs in education has n greatly accepted and it afirms the effectiveness.

Comparison and analysis has been done to some of the products available in the ket to differentiate their features in a sense of user-friendliness, level of difficulty, ractivity and also educational activities and interesting games designed to capture the rest of children below the age of seven.

Conclusion

A lot of aspects have to be analyzed in making an interactive storytelling package un and educational as possible. It does not only include the design of the layout but the interactivity between the child and the system. The story has to be interesting ugh to keep up with the demand of the child and also to encourage them to use it as of their learning activities.

CHAPTER 3

SYSTEM PLANNING & ANALYSIS

CHAPTER 3: SYSTEM PLANNING & ANALYSIS

Development Methodology

A methodology encompasses the method used to develop a system. Different hodologies can support work in different phases of the system life cycle, for example, ıning, analysis, design and programming, testing and implementation.

Waterfall Model

The linear or waterfall model is a development process that centers around ıned work and is best suited for projects where the requirements can be clearly ned. It is called the Waterfall Model because of its cascading nature, from one step to next. It groups development activities into a sequence of consecutive phases , as wn in Figure 3.2, which depicts the major phases – concept formation, system uirements definition, system design and development. Each phase itself is made up of e detailed activities (Hawryszkiewycz,1998).

The model consists of five primary activities, but sometimes it can also be broken eight activities , depending on the scale of the project.

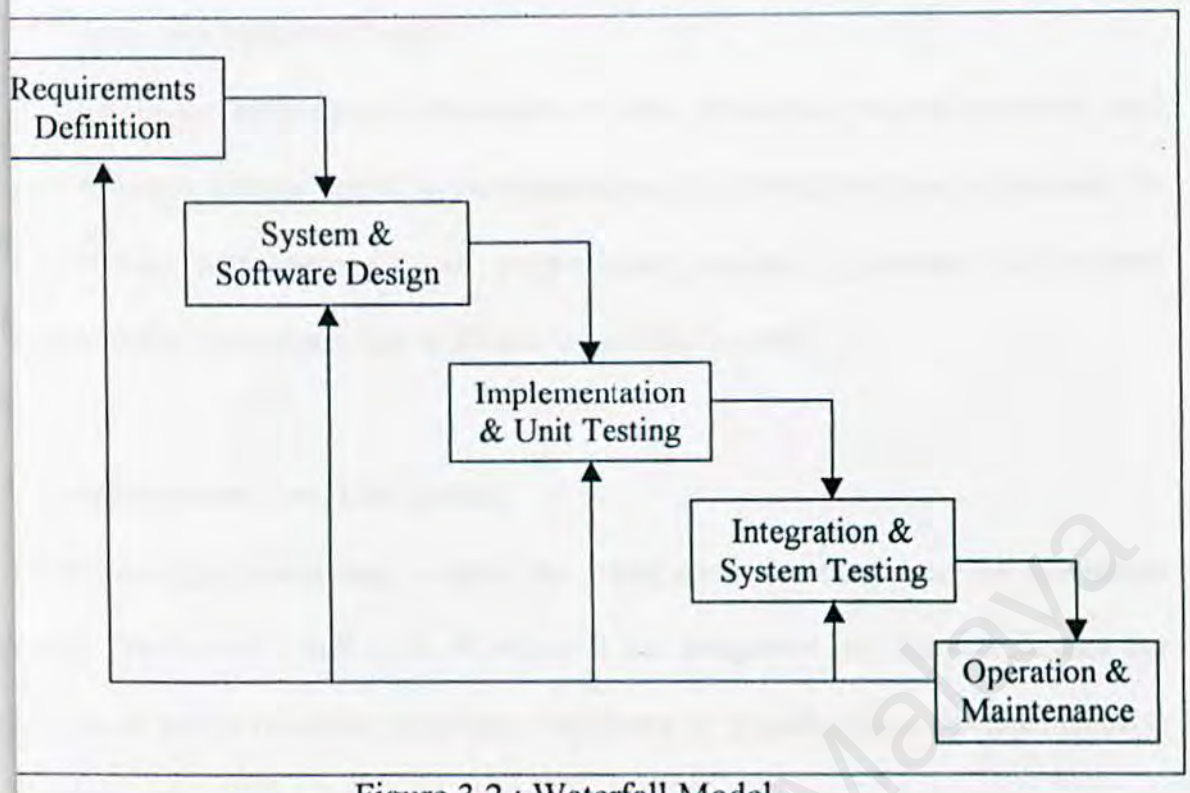

Figure 3.2 : Waterfall Model

1: Requirements definition

uirements analysis is the first step in the waterfall model process. This phase hasizes the refinement of the scope, concrete specification that becomes the dation for all activities that follow. To understand what is required, models are ted, problem is specified and implementation details are developed. The requirements to be reviewed to ensure that the perception of the system is accurate. Software irement analysis may be divided into five areas of effort: Problem recognition, uation and synthesis, modeling, specification, and review.

2: System and Software Design

ign enables the progressive refinements of data structures, program structure, and edural details. Design results in representations of software that can be assessed for ity. Design with the structured programming enables a designer to represent edural detail in a manner that facilitates translation to code.

3: Implementation and Unit Testing

e, the developers write and compile the actual code that turns into the executable grams. The system is still a set of programs, not integrated into a whole fleshed out duct. Each unit is tested to make sure it performs to specifications. Documentation is e often at this stage for the individual units, often by the people who code the ications. The primary objective of testing is to uncover any defects in the software. applying test case design, the developer can achieve more complete testing and eby uncover and correct the maximum number of errors before the user use it.

4: Integration and System Testing

of the separate programs, or units, are put together and flesh out as a system, or hed product. The overall system is tested to make sure the finished product works as as the individual units had before. After testing, the finished product is made lable to the user. More documentation is written here - system documentation rather individual unit documentation. Installation manuals, help files for overall system e, and such.

5: Operation and Maintenance

last step in the process is maintenance and it accounts for the majority of all money
ıt on computer software. Maintenance is the most expensive phase which include
r correction, adaptation and enhancement. Maintenance provides basis for future
ancement and also improves future maintainability and reliability.

1 Strengths and Weaknesses

There are few strengths and weaknesses in using Waterfall methodology.

ngths

It flows well, and is easy to understand from a broad viewpoint.

It is easy to implement.

Flaws are easy to find, as they are flushed out as every stage.

Product is well documented.

High Visibility.

Well known and well used.

More predictable application development projects

Greater chances of project delivery on time and within budget

ıknesses

Design cost is increased at every stage. The later a problem is found, the more it
costs.

Working product is not available for user's viewing until the finished product. The user must wait until the end to see any product and if the product fails, it signals process failure.

Too much time taken for development to be able to get on with the product.

Often difficult, to get design requirements at the beginning, especially from user. Children rarely know exactly what they want, and in what way they want it to be presented in.

Needs little or no prototyping. Prototyping will help illustrate and idea and build a system in an explorative way.

System Analysis & Requirements

The first step in the methodology is the system requirements definition whereby his phase, all the information needed to assist the process are gathered through sistent research from few resources available. The information are collected from :

Internet

Library of the University of Malaya

Articles from newspapers

Interviews and questionnaires

Existing software

Discussions and guidance from supervisor.

Interviews and Questionnaires

The questionnaires asked teachers to assess the effects of using the computer as a ıing tool on their students. A random sample of ten parents were interviewed over elephone regarding their perceptions of the effects of computer as part of the ıing tool.

Questions on user attitude towards the new method and unintended effects are ı here in order to get the information needed :

)o you tell stories to your children? If so, what kind of method do you use? (Reading tory books / listening to cassettes or video tapes / CD-ROMs)

Iave you ever trained / taught the children how to use the computer? (using mouse / eyboards)

ıre they interested to learn / try to use the computer?

Iave you ever tried any teaching method using educational CD-ROMs?

Vhat are their reaction towards the new teaching method?

Vhat activities appear most appealing to them? (Listening to the stories / Colouring / ounting / Singing / Identifying objects / Hide and Seek)

Vhat kind of stories attract them the most? (Animals / People / Fantasy / Adventure)

Additionally, the kindergarten children were also interviewed with simple ions about the use of computer. It is not completely impossible to get any mation from the children since a small number of them are able to answer simple ions on things they prefer .

A sample of 20 children has been asked few questions related to the system irements.When asked in individual interviews whether they liked to work on the puter at school, 98% of the children answered "yes" , 2% said "no". When given a CD-ROM for them to try out, one mother commented that her son was very positive ıt the educational CD-ROM that was given to him earlier at school. Another mother ırked that her daughter read enthusiastically following after every word pronounced e CD-ROM . Of the children, 94% indicated that they would like to learn reading and ng , 6% were not interested in using the computer.

Most of the children prefer stories with animal characters and adventures. They liked the colouring activities where they can independently chose the colours they and fill it in the picture given. And as a result of using the educational CD-ROM , e unintended effects were identified : increased self-esteem, interest in computer use writing skills. These effects were identified through the teacher and parent rviews. They were not measured by any standardized instruments.

2 Findings from Researchers on Preschools Learning

Study has been conducted involving 103 students from four kindergarten classes using computerized picture-word processor system which enable them to write sages on a computer by simply pressing buttons of picture-word on an electronic et without having to spell words or use extensive eye-hand coordination.

After two weeks, results indicate that students who received the picture-word essor instructions did significantly better in reading than those who received no uction. Furthermore the picture-word processor users responded enthusiastically to system , as evidenced by their reports and written messages and by the comments on tionnaires from teachers, parents and tutors of the kindergarten children (Li,1990).

Some educators assert that the use computer technology is one of the most ctive ways to teach early writing and reading. Because of the flexibility of computers creative tool for beginning writers, every school child should have easy access to puters (Li,1990).

Table 3.3 below describes the cognitive development of children between four to years of age (Norton,1987).

COGNITIVE DEVELOPMENT Children 4- 5 years old	IMPLICATIONS
Children remember to do three things told to them or retell a short story if the material is presented in a meaningful sequence.	Tell short , meaningful stories and allow children to retell them; picture stories help them organize the story. Give them practice in following 3-step directions.
They increase their ability to group cts according to important	Provide many opportunities to share concept books and activities designed to develop

acteristics but still base their rules on things look to them.	ideas of shape, colour, size and feel.
Age 5-6 years old	
Children learn to follow one type of classification (eg.colour, shape) through to completion without changing the main characteristic partway through the task.	Continue to share concept books and encourage activities that allow child to group and classify.
They count to ten and distinguish ten objects.	Reinforce developing counting skills with counting books and other counting activities.
They identify primary colours.	Reinforce colour identification through the use of colour concept books and by discussing colours found in other picture books.
They learn to distinguish between "a lot of" and "a little of" something.	Provide opportunities for children to identify and discuss the differences between these concepts.
Children require trial and error ore they can arrange things in order m smallest to biggest.	Share books that progress from smallest to largest. Have children retell stories using flannelboard characters drawn in appropriate sizes.

ey still have vague concepts of ne.	Share books to help them understand time sequence.

Table 3.3: Cognitive Development of Preschools

Functional Requirement

Based on the identified needs of the children obtained from the interviews and ature, the following characteristics is to be incorporated in the courseware.

User Interface

An interface is the part of an application that the user sees and interact with. The face includes the screens, windows, controls, menus, metaphors, online help, umentation and training.

Non-Functional Requirement

n-functional requirements are essential definitions of system properties and constraints er which a system should operate.

User friendliness

e most significant factor to be considered in interactive multimedia CD-ROM is the r friendliness of the package where features such as buttons, graphics, and screen out must be simple and friendly to the user.

elp

module is needed to help the user in any difficulties they are facing.

nteractivity

nteractivity between the user and the package is vital to provide them beneficial ience while listening to the stories and playing the games.

eliability

package has to be reliable in sense of availability and usability.

fficiency

s to act responsively to user's need in order to make it an efficient tool.

Software requirement

Developing an interactive multimedia application poses another integration lem at the software level. Software is the most critical factor in the manipulation and gration of multimedia content elements from various sources. In this phase, the ired software are analyzed and comparison are made between most of the software lable. These software include all kinds of authoring tools used to develop a timedia program.

requirements include

Authoring Tool

Windows 95 or 98 Operating System

Adobe Photoshop 5.0

be Photoshop is used to edit still images which has been scanned or imported. This is y powerful tool to edit pictures using varieties of features .

MIDI Maker

I (Musical Instrument Digital Interface) equipment is used to create music and sound cts using MIDI instruments such as piano keyboards, synthesizers, sound modules other MIDI products and then recorded directly into the computer for later ersion to a digital audio file (Holsinger, 1994).

Sound Recorder

nd Recorder is used to play back and record digital audio straight into the PC as V sound files. Like the Media Player, the Sound Recorder software accesses and rols the sound hardware using a transport control to start, stop and record digital o (Holsinger, 1994). Voice are recorded through a microphone that converts the d into analog.

Media Player

I Multimedia Authoring Tool

Authoring tools are tools used to create multimedia applications without the need se conventional programming. These are usually object-oriented development ems, some of which use sophisticated GUIs to assist multimedia developers in nbling interactive multimedia presentations.

Authoring tools handle individual screens, or frames, as higher level objects that contain hundreds of basics objects such as text, graphics, shapes, animation, audio video sequences. These frames also include objects that control branching between es and access to other media sources as required.

There are several dozen authoring tools on the market over the years, and rent authoring facilities have been developed and used to create interactive imedia applications of various levels of complexity .In this project , three authoring have been taken into consideration

2 Why Authoring Tools?

Interactive multimedia applications may be developed using any computer uage, particularly C++, Java and other object-oriented programming languages. The of higher-level authoring tools may prove to be more costly than programming a le application from scratch using conventional programming software prowicz,1994).

However, the use of authoring tools are advantageous because they are designed multimedia developers in mind. A single authoring tool combines all the functions interfaces required to join various media elements from different sources. This saves nificant amount of development time and money for identification, design, testing programming of such interfaces (Szuprowicz,1994).

In order to make the process cost-effective the multimedia application used must most productive software tools to accomplish a significant multimedia integration Most authoring tools have object-oriented tools within their own environment in to allow the development of complex interactive multimedia systems with relative even by individuals with no previous computer programming experience rowicz,1994).

Authoring systems separate authoring from programming. They have been oped to enable designers of content to integrate media elements with relative ease.

The existence of authoring systems does not preclude programmers from ning interactive multimedia applications using programming languages. However, eviously indicated, because content and form are critical to success, an authoring ms tend to increase the productivity of any such effort.

Authoring systems effectively remove programmer from the loop. This is often able because even the best programmer can have a specific mindset regarding what a puter-based application should look like. This mindset can differ drastically from an effective interactive multimedia system must be. Programmers are sometime ly insensitive to end-user preferences and the need to focus on content and format of imedia products (Szuprowicz,1994).

Comparing and Selecting Authoring Tool

The recommended approach to selecting a particular authoring tool is to mine well in advance the needs of an interactive multimedia application in terms of sources, types of media involved, target user and objectives of the application itself rowicz,1994).

Today software tools such as Macromedia Director, Authorware 4.0 and ietric Toolbook II can make authoring even more powerful. These authoring tools been analyzed and compared in terms of facilities, performances, user interfaces, ation features , text handling, graphics options, transitional effects and also audio ideo support capabilities.

Table 3.6 is an example of a desirable features of an authoring tool.. It is a rehensive representation of the most desirable functions of any authoring system.

thoring Facility	Desirable functions
Interface	Integrated Flowchart, WYSIWYG interface, GUI, Icons, Menus
Handling ons	Styles, Formats, Fonts/Size/Colours, ASCII Imports, Word Search, Paragraphs, High Screen Resolution
hics Options	Freehand Drawing, Primitives, Text Overlay, Palette Editing, Graphic Imports Files, Vector-based Drawing, Cut and Paste, Fill, Clip Art, Screen Capture
nation Features	Path, Cycle, Transitional Effects, Animation Imports,

	2-D, 3-D, Canned, Sprite, Cell
io Options	Computer Sounds, Analog Sources, Digitized Sources, MIDI Interface, Digitized Audio Board, Edit Digitized Audio, Speech Synthesis, Laser Disk Audio channels
rnal Inputs faces	Videodisk, VCR, CD-ROM, Digital Camera, Audio Cassette, Synthesized Audio Board, Video Digitizer, Full-Motion Video Board, TV Tuner
o Options	Full-screen Motion Video, Video Windows, Multiple Video Inputs, Seamless Videodisk Search, Overlay Video with Text and Graphics
em Functions	Branching, Test While Authoring, Runtime Creation, Timeout, Notetaking, Bookmark, Calculator, Graphical Database Maintenance, Navigational Buttons, Variables, Help, Printing, External Links, Documentation, Debugging/ Editing Tools
-User Controls	Keyboard, Mouse, Touch Screen, Graphic Tablet, Light Pen, Trackball, Joystick, Speech Recognition

Table 3.6 : Desirable Features for Authoring Tools

4 Analysis on Authoring Tools

An authoring tool generally contains a user-friendly working interface, internal faces for accepting external media input sources, a facility to import text and hics, draw and paint capabilities, animation features, audio and video manipulation editing functions, various interactivity functions and a choice of user input controls. necessary to evaluate the most outstanding authoring tool against requirements of the

ication to determine which is likely to provide the best performance and most prehensive coverage.

Amongst the selected authoring tools are Macromedia Director 7.0, Authorware 4 Asymetric Toolbook II.

cromedia Director 7

Director 7.0 is an authoring tool developed by Macromedia. It has been upgraded new features like embedded fonts, scaling and rotation of sprites, alpha channels, i-user, support, and new Internet optimizations. Macromedia's Director 7 is pivotal technology, allowing developers to create a rich interactive erience both on the Web and CD-ROM.

Director 7 seamless HTML integration, full support for QuickTime 3 and uming media, shocked fonts, and faster, simpler Shockwave Player itecture all reinforce Director's standing as the number one ication. Director 7 has a clear goal that is to produce interactive media that s good and functions well on low-bandwidth Internet nections. It is also includes optimized Shockwave playback, more efficient ways to nate cast members, and direct support of Java and HTML.

Director 7.0 is a time based authoring program. Instead of cards or book pages, ctor movies are made of series of individual frames. As the movie is played, frames

splayed revealing their elements. Because time based authoring programs work by ying a series of frames, they are especially good tools for creating animations.

In this project, Macromedia Director 7.0 has been chosen as an authoring tool se it has more features compared to other authoring tools available. It is one of the uthoring tool availabe nowadays. Meanwhile, this program is also taught in one of bjects compulsery for Management of Information Systems students. Hence, it is a practice to apply my knowledge in using this tool as part of my project.

Director 7.0 is also available at the computer laboratory in this faculty. With the f this facility, I have decide to make the full use of what is offered.

orware 4

Aside from Director, this is another best-known product from Macromedia. rware is an iconic tool specifically designed for the developer of educational and ng application by non-programmers. It was designed for non-programmers and es no coding , thus making it easy to learn and use.

Each of the eleven icons available to the workspace has a particular function , like ying decisions and the developing process involves dragging icons from the toolbar owchart which controls the program flow.

ısy to use - no coding required

ɔpular in Mac and Windows versions.

ɔod internet product support via Macromedia homepage

ɔnditions attached to commercial runtime distribution

ɛpensive, slow execution compared to compiled application

ɔor screen design capability

ttle Windows look and feel.

ıetric Toolbook II

Toolbook II is an object-oriented development environment that provides drawing for creating objects and a full-featured programming language, called OpenScript, rogramming object behaviour. Asymetric Toolbook II uses a book and page hor, related to Hypercards' stack and card idea. It is a more general-purpose ɔping tool than Visual Basics and Authorware as it can be used to produce not just eware but also applications such as databases. It is particularly suited to text ing and is ideal for application with large amounts of text.

ısy to use and learn

ɛcellent Internet product support

ɔ distribution restrictions

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asy to use and learn

xcellent Internet product support

o distribution restrictions

expensive

sy screen design

oderate learning curve for novice developers - lots of coding required

ow execution compared to compiled applications

lardware requirements

2 MB RAM

ntel Pentium 133MHz processor

GA monitor

EC CD-ROM Drive 282

oundcard

lonitor

canner

licrophone

peaker

eyboard

louse

rinter

ummary

Chapter 3 elaborates all the information needed in systems requirements and sis. The first part of the chapter explains about the methodology used in developing stem. In this project, the methodology used is the waterfall methodology and every f the method is elaborated together with the chart of the methodology.

In defining the requirements, interviews, surveys and researches have been done der to obtain the information needed. Interviews have been conducted on few rgarten teachers and parents about children's interest and development.

In developing a multimedia interactive package, few selections of authoring tools been analyzed and compared to select the best authoring tool which can perform ding to requirements. Comparison is included in this chapter to provide a clear e of the features for each authoring tool.

Lastly, after the software requirements have been determined, the hardware ements are stated to show what kind of hardware is used to build the system.

onclusion

Creation of an interactive multimedia platform involves integration of hardware onents, some of which are incompatible with current desktop equipment. It also es many other important features that has to be taken into consideration such as capability and background knowledge. In this project, children's cognitive

cteristics must be considered to analyze what they are like and what kind of ies can help enhance their skill.

Selection of an authoring tool for the development of an interactive multimedia ation is a critical decision that has a bearing on flexibility of design, resource ements, ease of developments and ability to integrate various sources.

Compatibility with other existing and proposed application design consideration e an issue, but each multimedia project should be accessed with regard to specific ives, target audiences, delivery capabilities, availability of skills and maintenance s over the projected life of the application.

CHAPTER 4

SYSTEM DESIGN

CHAPTER 4: SYSTEM DESIGN

1 System Design

The system design phase is a very important stage where it is the creative rocess of transforming the problem into a solution. This phase also helps the esigner to describe features of the system, the components or the modules of the ystem and their appearance to the users. Basically this phase gives user the idea of ow the running program is going to look like.

The package design is divided into two sections :

) Interface Design

) System Structural Design

.2 User Interface Design

Interfaces are used in many different kinds of purposes such as for searching, s a tool, browsing, buying, learning and entertaining. In designing interfaces, few actors have to be considered in order to make the interface looks attractive and easy o navigate by the user. It is also important to keep the interface simple yet attractive n order to keep the user interested.

Some of the most important considerations when designing interfaces are the nes involving how people think and learn (cognition). Below are some guiding rinciples for cognitive processing (Weinschenk, Jamar & Yeo, 1997).

Limit memory loads

eople have short-term memory, after 20 seconds they will lose the information if ey cannot quickly store it in long-term memory.

Break down decision-making

ecision steps have to broken down into manageable parts using group boxes and bels to help them distinguish which decision they should be making at a given point f time.

Provide context

ontext provides specific meaning and interpretation. Some ways of providing ontext are using titles, labels on screen titles, buttons and menus.

Be consistent

ne of the ways to facilitate a good mental model quickly is through consistency. eople rely on consistency in order to find information quickly, create an accurate ental-model, and make decisions.

Be forgiving

he interface has to allow user to explore without doing damage. There has to be built n ways for users to cancel out, go back, and undo actions.

ther aspect to be taken into consideration is visual considerations.

isual considerations include :

Minimize the eye movement

creens and windows have to be designed in a way that users can start at the top and ork their way down without having to move their eyes back and forth or up and own a lot.

Adhere to principles of good format and layout

nformation should be placed to follow the pattern of reading, for example, people ho read English and Bahasa Malaysia will tend to look at the top left of each screen, nd then move both left to right and top to bottom.

Use colour and highlighting judiciously

olours and highlighting should not be abused or overused. Techniques such as nderlining, using boxes, or colour can be useful and powerful to visually grab ttention. Whenever the colour or highlighting is used, there should be a reason in oing so. Otherwise, avoid using any technique in that particular area.

Use visual coding

isual coding such as graying out unavailable options to provide visual meaning to ata on specific areas on a screen.

.3 Conceptual Design

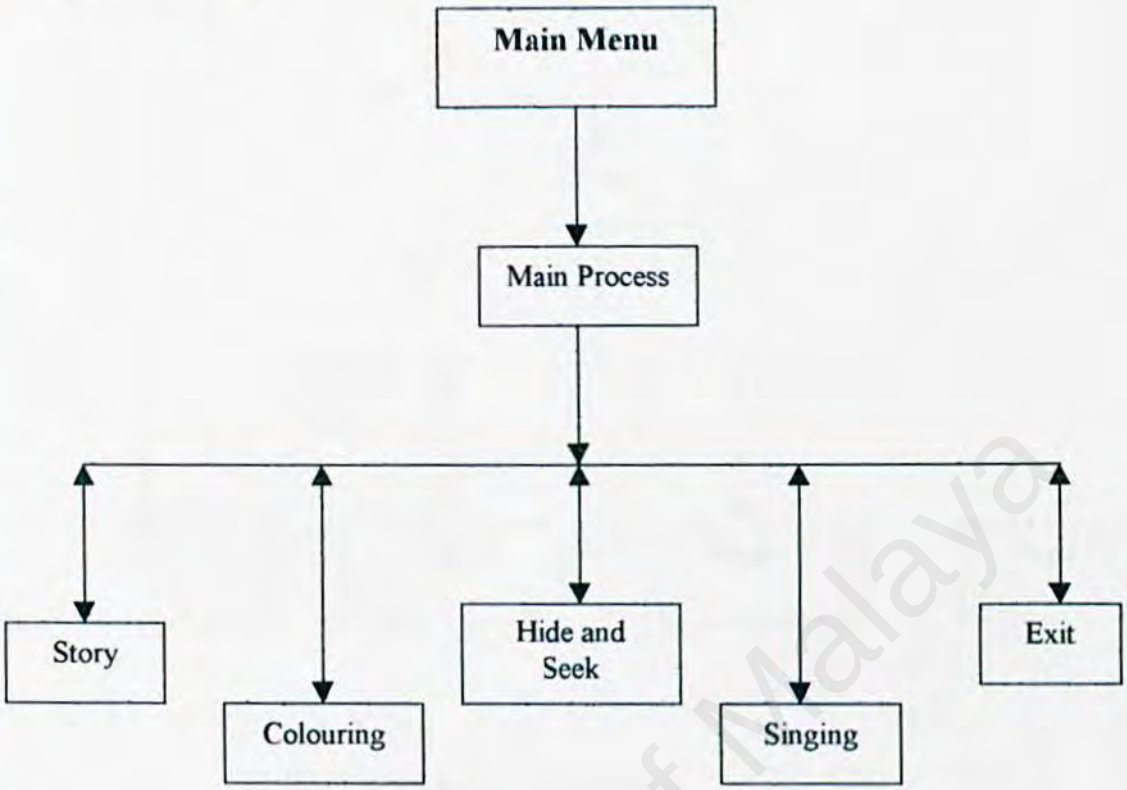

Figure 4.1 : Hierarchy Chart of Main Menu

he design of the modules are divided into 4 modules :

Story Module

his is the main module in this package. User will be given choices button to navigate asily throughout the storytelling, which means they are given freedom either to stay the module or to jump into another module while the story is running. The whole ory is in included in this module. There will be a narrator reading the text on each age and every word spoken will be highlighted in order to guide the children.

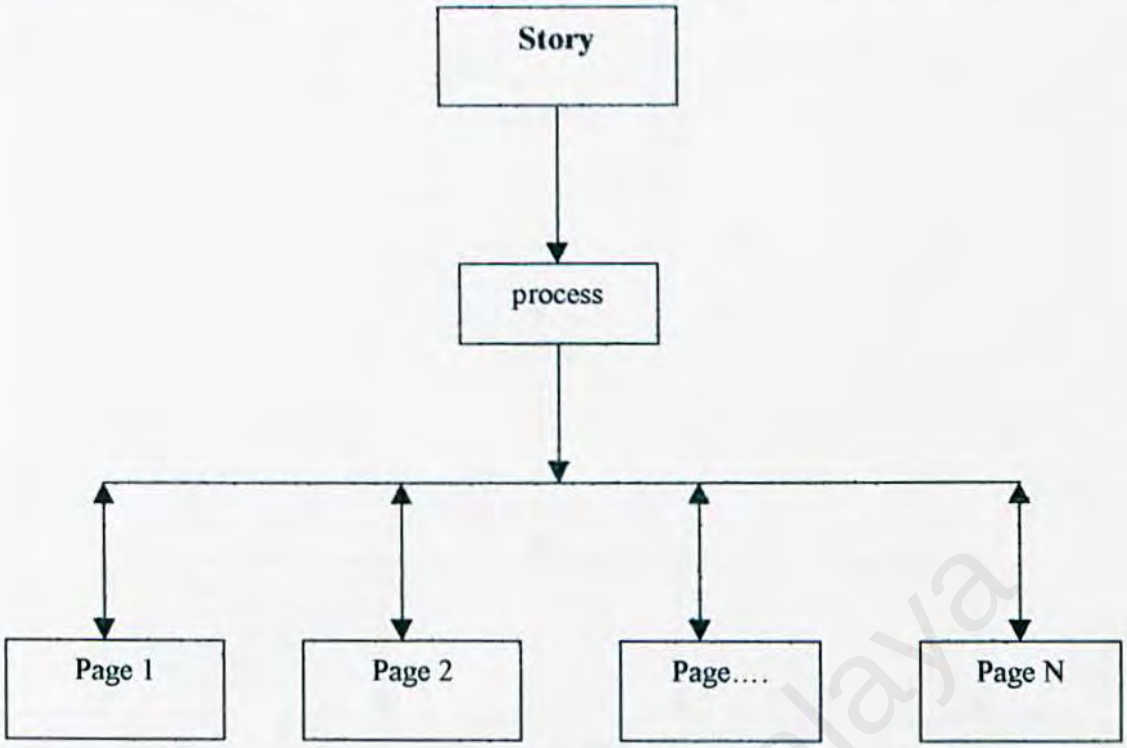

Figure 4.2 : Story Module

Colouring Module

Children can try drawing and colouring activities in this module. In this rticular module, colours are will be given on the pallete and several choices of ushes will be included.

The user will be able to pick colours according to preferences and draw on the ank canvas. Additionally, to make it more interesting, user will be able to erase their evious artwork to start anew. On exit, user can go back to main menu.

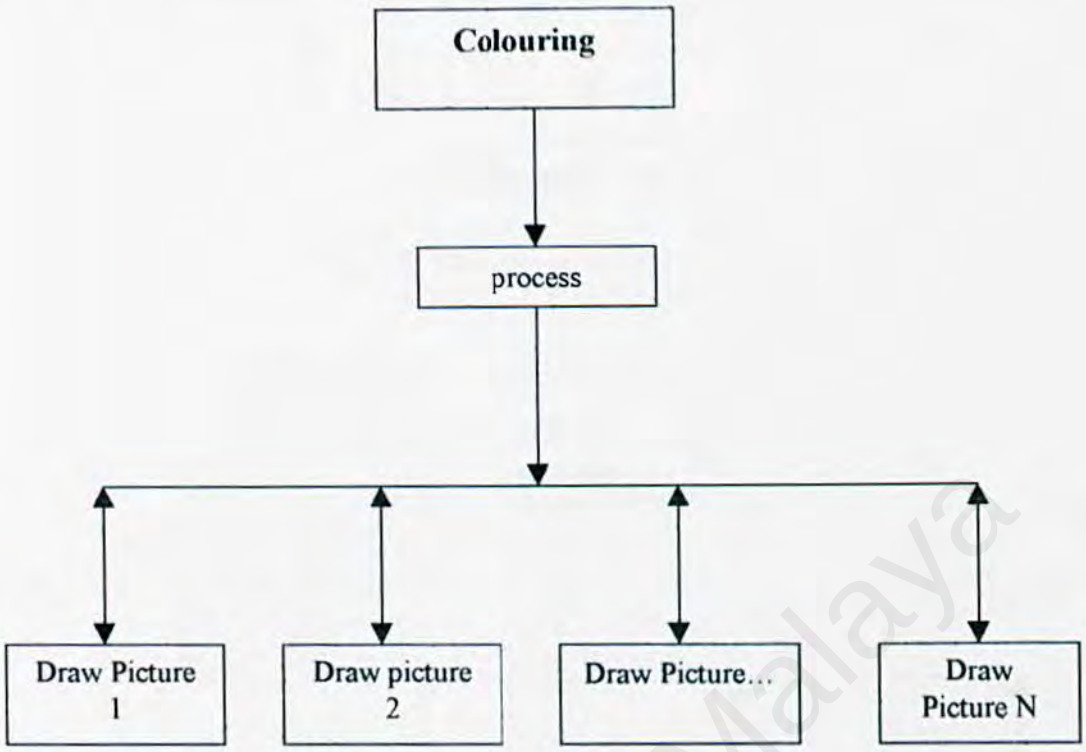

Figure 4.3 : Colouring Module

Hide And Seek Module

This is a game where children have to find the characters which are hiding mewhere in the picture. Clues will be given on what they have to look for. This me will have to incorporate interactivity entirely because the user needs to interact ith the system throughout the game.

The clues can be given in few manners for instance, the objects on the screen ill change behaviour when the user roll the mouse over. This indirectly will give nts to the user on what is hidden behind the object. When the user clicks the wrong ject, a hint such as a particular sound will be played to let them know that it is

ong. Reward , such as sound will be played if the user guessed the correct object.

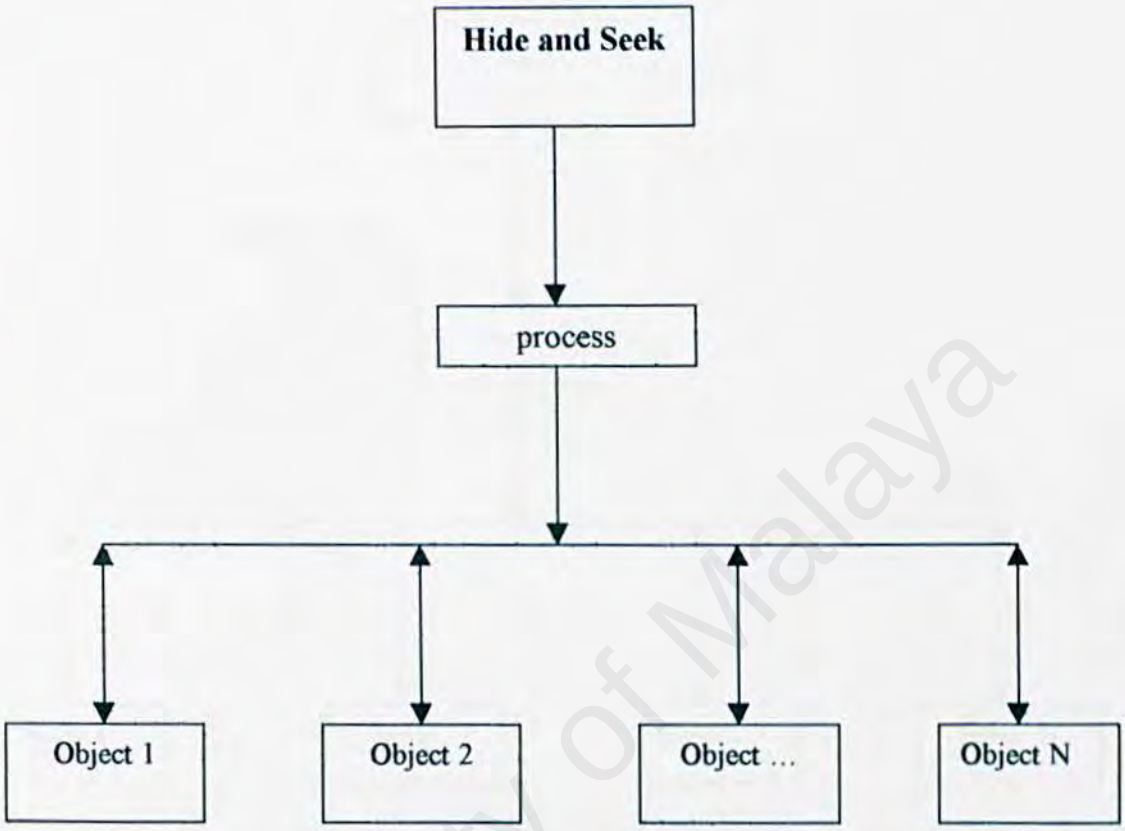

Figure 4.4 : Hide and Seek Module

Songs Module

Children's songs are played according to preference. There will be a few oices of songs to be played. The lyrics will be given so that the children can sing ong. There will also be a choice whether they would like the voice to be turned on not. They can sing to the songs with the minus one version. After the song is ayed, the navigator button will guide them to either the main menu or the menu of

songs.

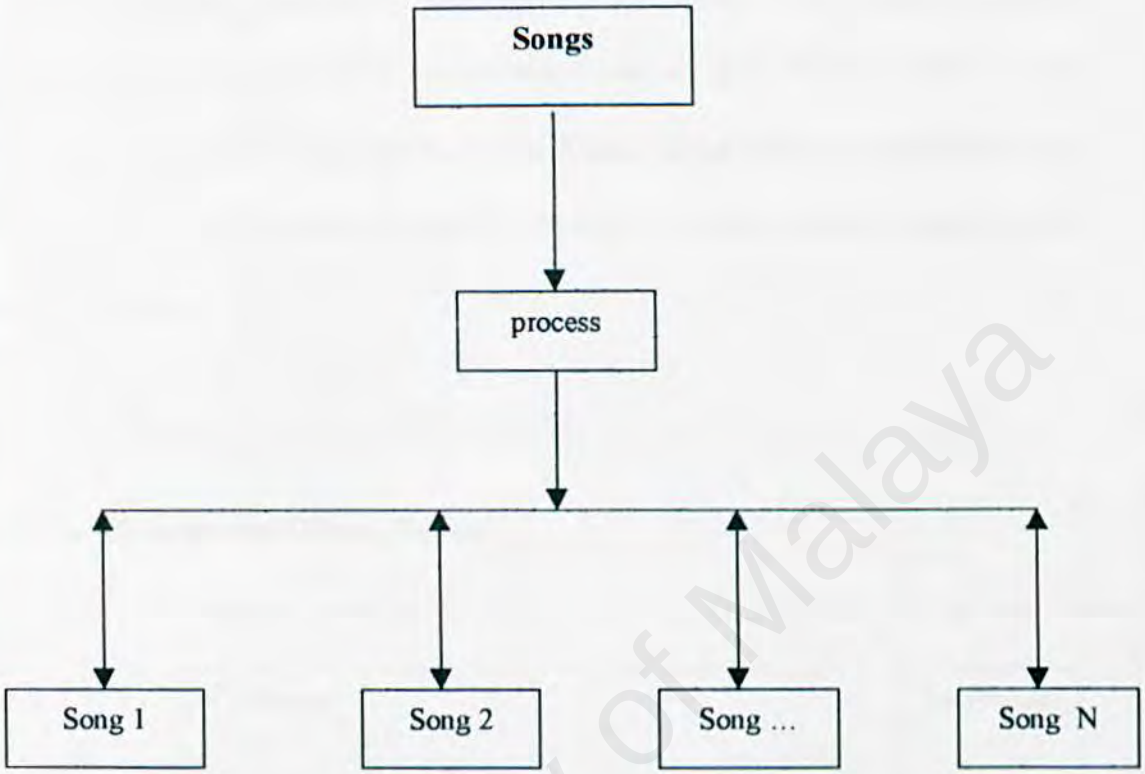

Figure 4.5 : Song Module

Exit Module

Children can quit and exit the activities that they are doing at any time they e. A quit screen will appear when the user clicks on the exit button. Upon the cking, another screen will appear to ask for confirmation in any case that they ange their mind. The user can go back anytime if they don't feel like quitting.

4 Screen Design

Screen designs illustrate the geographical placement of the navigational and eraction buttons used on the screen. It also gives an idea on the layouts of the erface for each module. It is vital to plan and arrange the buttons, images and text ed in order to make it easier for user to see and to make it more organized with nsistent layouts.

4.1 Main Menu Screen (Menu Utama)

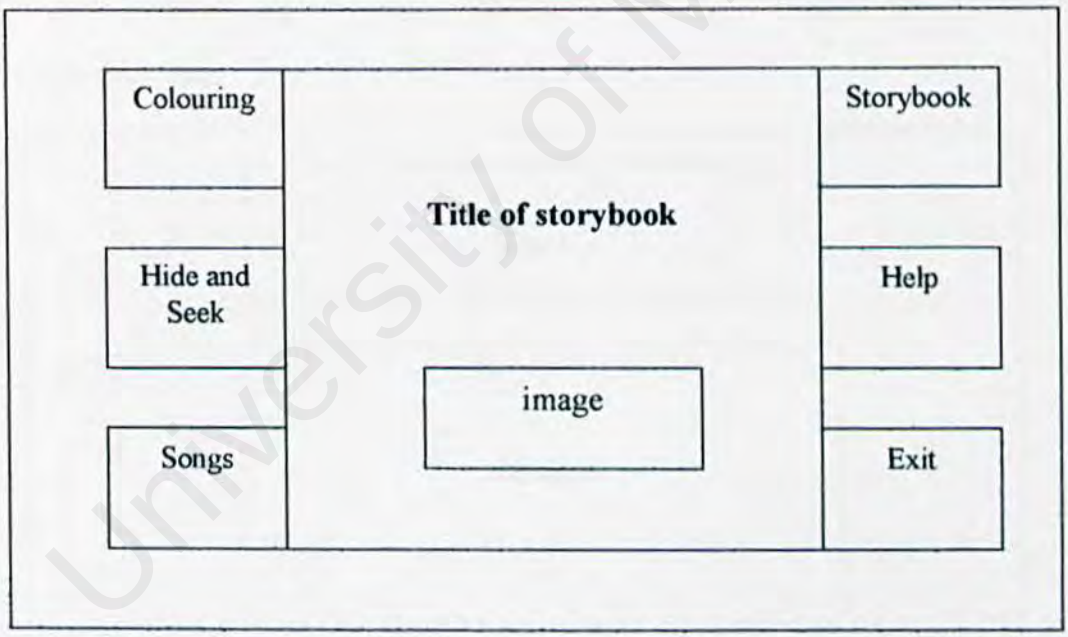

Figure 4.6 : Main Menu Screen

The main menu screen consists of images and buttons which links the page to e story, colouring, singing, hide and seek, help and exit module. The exit button will nk to the exit screen. From the exit screen, there will be another screen that will

ear to confirm the user's final decision.

The title of the story and the image will be placed at the center of the main nu in order to capture user's attention. To start reading, the user have to click on start button.

It is important to have a very attractive main menu as this is the first page the r will see. An interesting page will give some idea on how the rest of the pages low and indirectly motivates them to start reading. Colours and arrangements of the ttons are equally important.

4.2 Story Book Interface

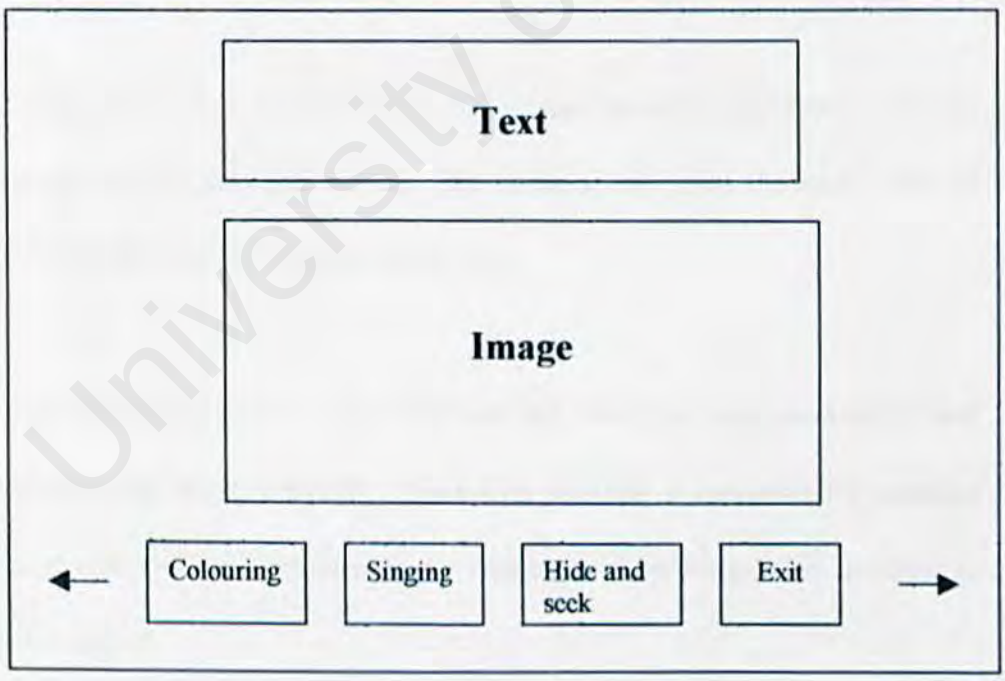

Figure 4.7 : Story Book Screen

The story book screen is designed somewhat different from the conventional ok we normally read. The interface is properly arranged so that all the buttons, the ages and the text fit nicely with simplicity.

ere are six control area assigned to each button on the screen.

Arrow back button – allow the user to return to the previous page.

Arrow forward button – allow the user to navigate to the next page of the rybook.

Singing icon – allow the user to exit and go to the singing module.

Colouring icon – allow the user to exit and go to the colouring module.

Hide and Seek icon – allow the user to exit and go to the hide and seek module.

Exit icon – allow the user to stop reading and quit the program.

On starting of the page, sound will be played automatically and stops when the er clicks on the next or previous button. The narrator will read the book and the rds will be highlighted as the narrator goes along.

With this highlighted feature, the children will recognize the word easily and ll try to pronouce the words correctly. Since this package is targetted for children low 7 years of age, this will promote faster reading and spelling skills in order to epare them for school.

.3 Colouring Interface (Mari Mewarna)

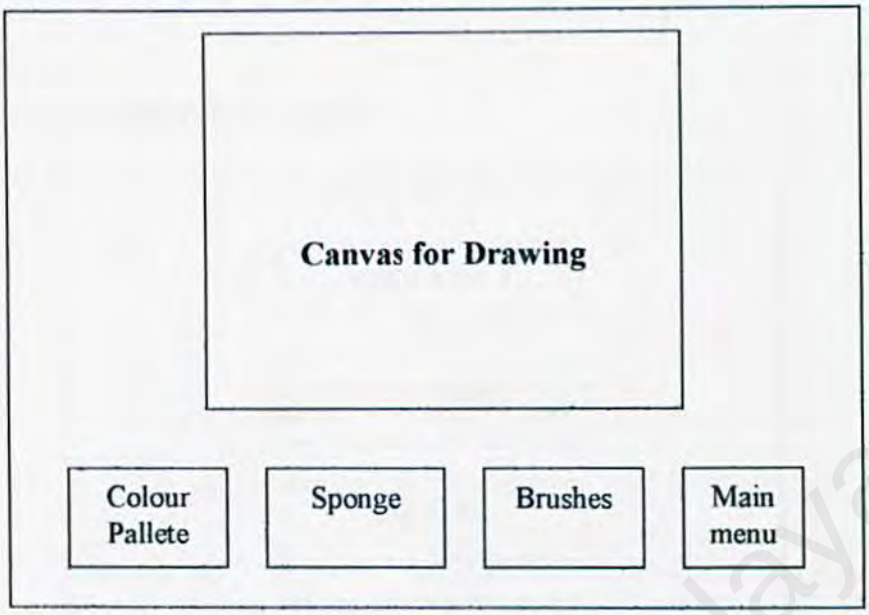

Figure 4.8 : Colouring Screen

The colouring module is designed to make the user feel like they are actually awing on a canvas. There are a few selections of brushes that come in different es. There will be a colour pallete where the user can pick any desirable colour and rt painting on the canvas. The sponge is used to erase the picture drawn so that the er can start on a new painting.

There is quite a selection of attractive colours in order to make it more scinating. This is where the children can play with the colours they like and they are ven the freedom to draw anything according to their fondness. The module is named olouring rather then drawing because children are more attracted to colours and this odule lets them play with colours while drawing.

If the user wish to quit, they can return to main menu in order to exit from the

n.

Singing Interface (Mari Menyanyi)

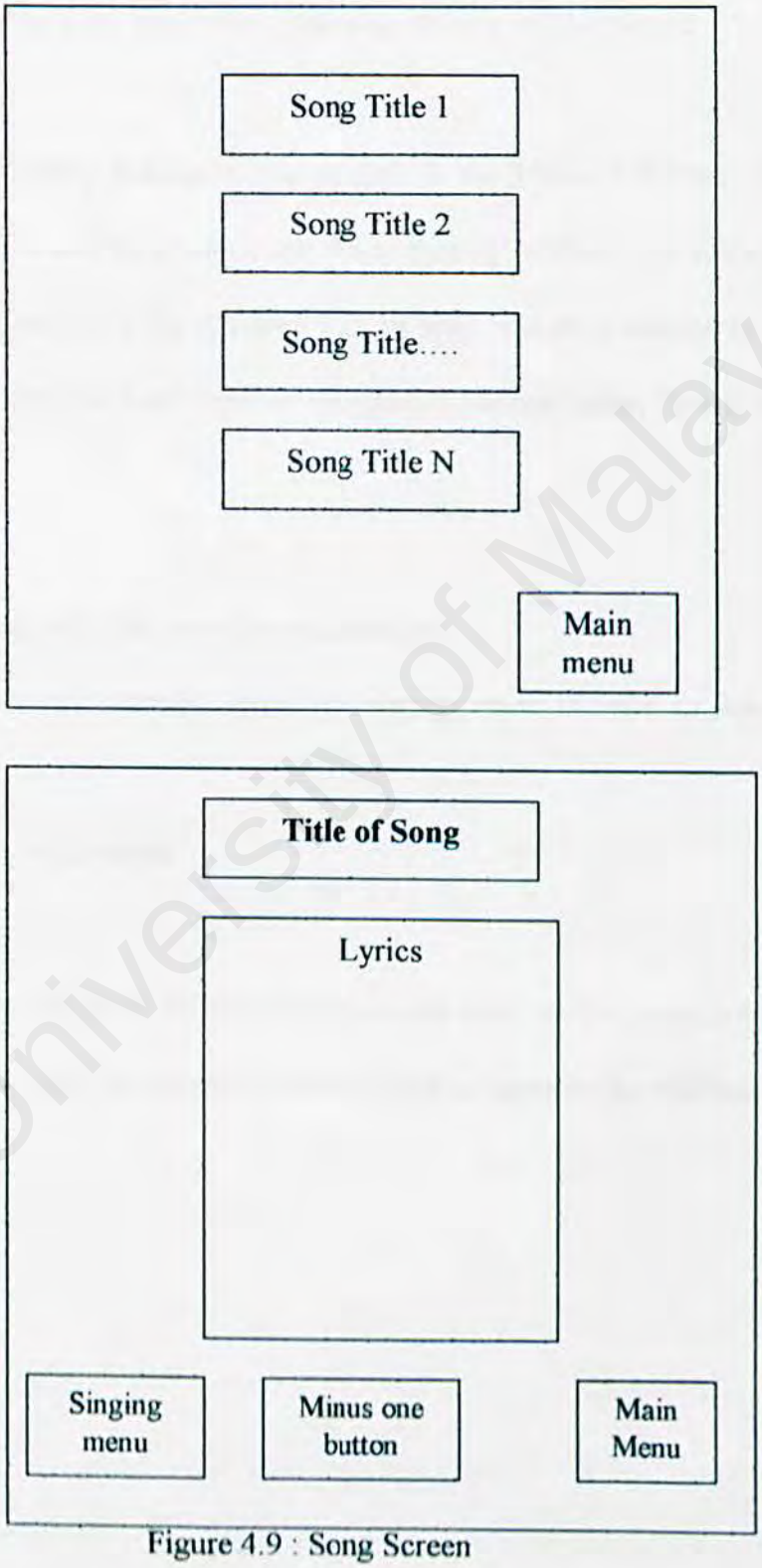

Figure 4.9 : Song Screen

The singing menu will list all the songs featured in this module and the user will be able to choose according to their preferences. In order to choose, the user has to point the cursor to the title of the song and clicks the mouse button. Automatically, the page will link to the song page where the song chosen will be played.

Another interesting feature in this module is the Minus 1 button. When the user clicks on it, there will be a minus one track playing (without the voice). This is quite interesting especially if the children like to sing, which is similar to karaoke. Furthermore, if the user has a microphone plugged to the computer, then it will more enjoyable.

To quit from the song page, the user has two choices :

a) They can use the arrow button to go to the singing menu in order to choose other songs.

b) Exit and return to main menu.

All the songs will be in Bahasa Malaysia and most of the songs are the usual children's favourites. They are carefully selected and are suitable for children all ages.

4.4.5 Hide and Seek Interface (Cari Saya)

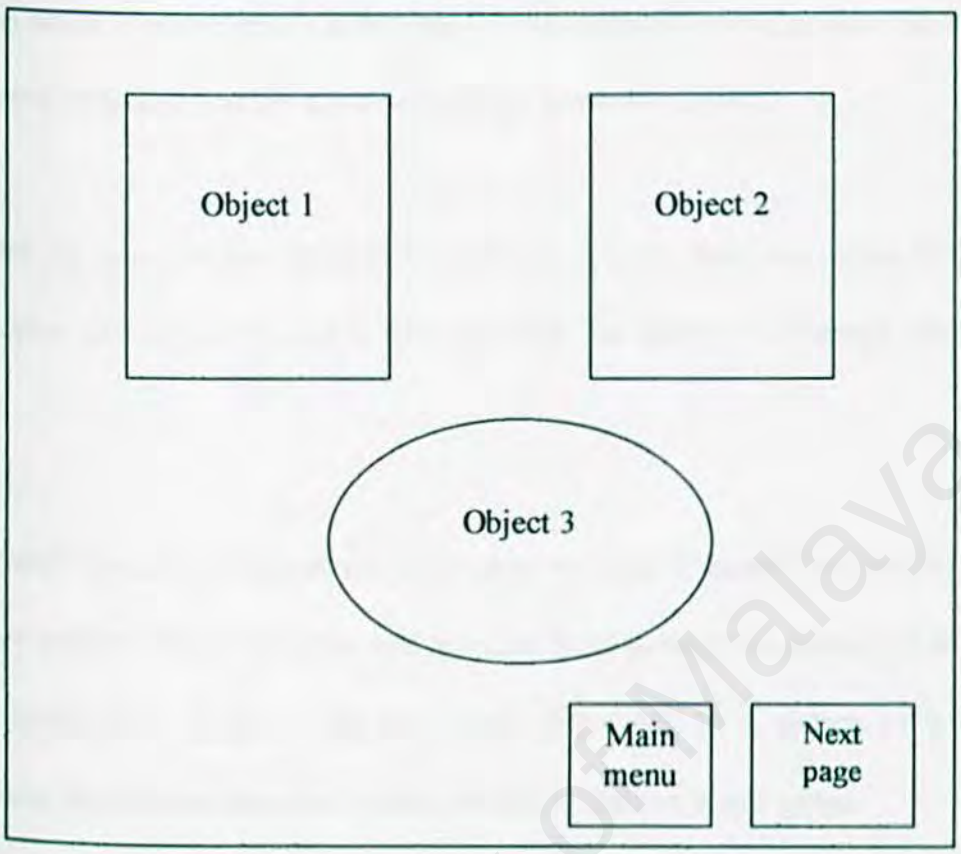

Figure 4.1.1 : Hide and Seek Screen

Hide and seek is the most popular game among the children and that is why I decided to produce such game in this program. In this module, children will need to search for things that are hidden behind objects on the screen with only one type of object in each game but the number will vary for each game they play.

For starters, the hints will be given on what kind of object to look for. The interactivity is important as the user will be interacting with the system throughout the game. For example, whenever the user roll the mouse over certain object, the characteristics of the object will change, giving them hints that something might be

hiding behind it. When the user clicks on the object, the answer will be given whether the object is really hidden there or otherwise. If they guessed wrongly, then there will be an indicator telling so and the same goes if they guessed correctly.

I find this game rather amusing for children. It gives them the power to be in control of what they are doing and it also develops the children's strategic thinking and agility.

The exit button is included on every page to make it easier for them to quit anytime they wish to. The quit button will navigate them to the main menu first before they can actually quit. To go to the next game, there will be a picture of a page flipping where the children can click on the picture to start on a new game.

4.5 Summary

Chapter 4 gives vague picture of how the actual screen is going to look like. All the screens which are going to be incorporated are designed briefly in here. For each module, each of the screen are shown together with the navigation buttons and the layout of the text and images.

Each of the module presented are also given some brief explanation on how the screen operates. It is important to let the user navigate freely throughout the story telling and that is why the navigation buttons should be included on every screen.

CHAPTER 5

SYSTEM CODING

CHAPTER 5 : SYSTEM CODING

5.1 System coding

After designing the system, the following stage is the writing of the programs. In this phase, the focus is on implementing the solution as a software. In other words, the programs that implement the design must be written carefully in order to meet the goal.

There are many ways to implement a design and many languages and tools are available. In this package, since it is built using Macromedia Director 7.0, the scripting language used is Lingo scripting.

All programming languages allow a problem to be solved in a variety of ways. Lingo is the programming laguage of Director which allows you to do many wonderful things if you master the language.

Coding perform tasks that translate design into a machine-readable form. If design is performed in a detailed manner, code generation can be accomplished mechanistically. (Pressman, 1992)

5.2 Coding Approach

Good programming skills will produce a reliable system.

- *Readability*

Code documentation is important in the readability of the system. Code documentation begins with the selection of the identifier (variables and labels) names, continues with the composition and commenting and ends with the organization of the program.

- *Naming Techniques*

A good and meaningful technique for the variables, controls and modules provides easy identification for the programmer. The naming convention is created with coding consistency and standardization in mind.

- *Internal Documentation*

Internal documentation and comments provide a clear guide to the developer and readers about the function of a particular source code in the program. So, comments provide the developer with a means of communicating with other readers of the source code. A statement of purpose indicating the function of the module and descriptive comments are embedded within the body of source code is used to describe processing functions.

- *Modularity*

Before entering the coding phase, developer has divided the project into several modules (as explained in the system design phase). The main purpose of modularity is to reduce the complexity of the system and to facilitate the developer to implement it by encouraging parallel development of different parts of the system.

For example, there are four modules in this package which are the Storytelling module, Colouring module, Hide and Seek module and Songs module. By having modularity, developer can implement all modules at the same time and does not have to wait for the completeness of a certain module before going into another module.

5.3 Coding Style

Coding style is an important attribute of source code and it determines the intelligibility of a program. An easy to read source code makes the system easier to be maintained and enhanced.

The following lists some of the style used during coding phase of this project :

- Selection of meaningful identifier (variables, forms, labels, commands, images, pictures and timers) names.
- Description and appropriate comments written in the source code (normally to the right of the program lines).
- Indentation of codes increases the readibility of source code.

5.4 Lingo Scripting

5.4.1 What is Lingo?

Lingo is an English like programming language of Director. All the commands, functions, and other keywords in Director are English words, group of

words, or abbreviation. This makes Lingo easier to learn than any other languages. (Rosenzweig, 1999)

Lingo is a cast member type, which means that when Lingo code is created to control the movie, it is stored in the cast members called scripts. Scripts are cast members that contain a piece of text that is valid for Lingo code. (Rosenzweig, 1999)

Out of all the possible things that Director can do, only a handful of them can be done without using Lingo. That is how powerful Lingo is. In some cases it is not the best tool for the job, but in other cases Lingo can be used to program a piece of software with less efforts than traditional methods. (Rosenzweig, 1999)

Lingo started out as a simple set of scripting commands used to control animation. Now it is a complete object-oriented language rivaling traditional ones such as C and pascal. There are more than 800 Lingo keywords and all standard programming language structures. This makes Lingo every bit as powerful as languages such as C++, Pascal and Java. (Rosenzweig, 1999)

5.4.2 Lingo Basics

To develop this CD-ROM, some of the behaviours are developed using simple Lingo script. There are four different types of script members : Movie scripts, behaviour scripts and parent scripts. In addition, other cast members, such as bitmaps, can have scripts embedded inside themselves called Cast scripts.

- *Movie Script*

Movie scripts are available to the entire movie, regardless of which frame the movie is in or which sprites the user is interacting with. When a movie plays in a window or as a linked movie, a movie script is available only to its own movie.

In addition to responding to events such as key presses and mouse clicks, movie scripts can control what happens when a movie starts, stops, or pauses. Handlers in a movie script can be called from other scripts in the movie as the movie plays.

Figure 5.1 : Movie script channel

- *Behaviour Scripts*

Behaviours are attached to sprites or frames in the Score. Behaviours assigned to sprites are sprite behaviours. Behaviours assigned to a frame's behavior channel are frame behaviours.

Director includes a set of behaviours that are already written. Using Lingo, one can create additional behaviors for specific needs. Behaviours are script cast members that appear in a Cast window. The same behaviour can be attached to more than one location in the Score. But when a behaviour is edited, the edited version is applied everywhere the behaviour is attached in the Score.

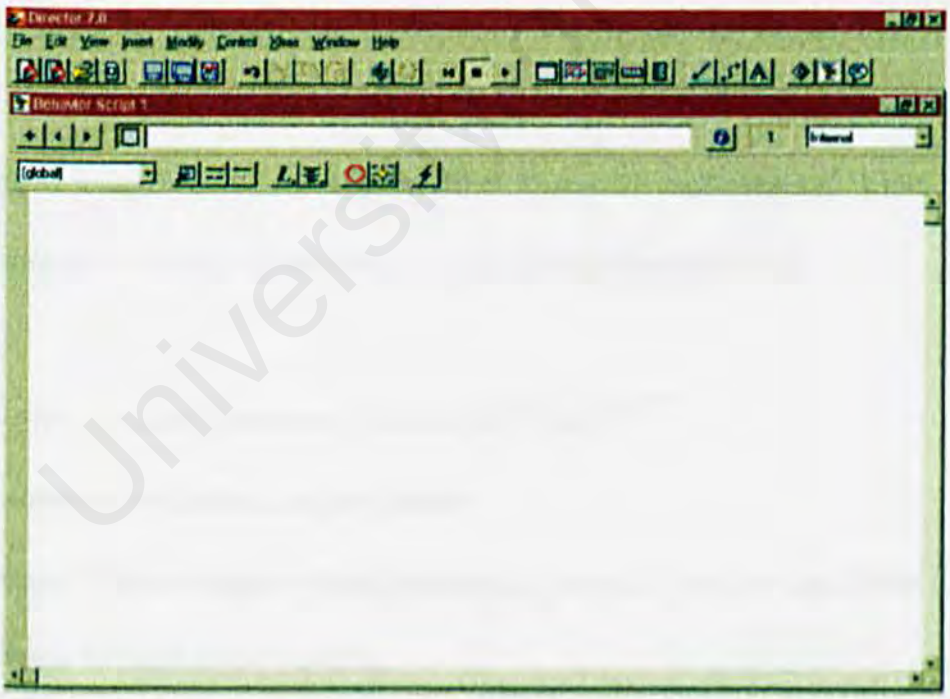

Figure 5.2 Behaviour Script channel

- TIFF – Tag Image File Format.

After any of these files are imported into Director as bitmaps, it is now become a bitmap cast member. The example of the imported cast members are shown below.

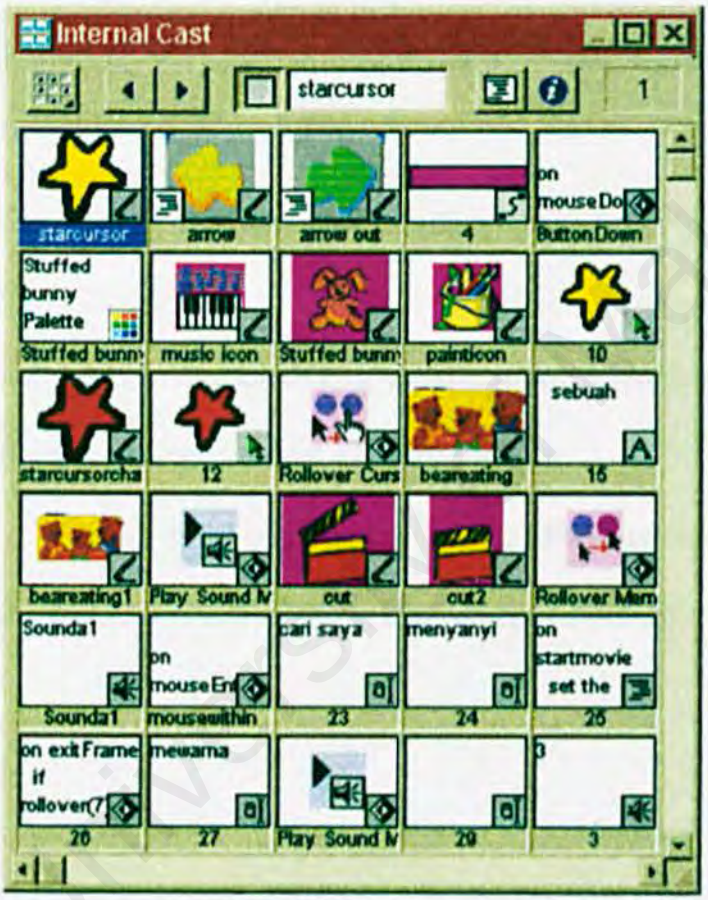

Figure 5.3 Cast member window

5.5.1 Editing Bitmaps

All the bitmaps imported can be changed or edited using the paint window. Most of the bitmaps have to be edited first before using it on the stage. The paint window in Director is quite similar to the one in Photoshop. It has all the tools

needed to edit a picture such as the Lasso and Marquee tools, which are used to select an area of the image to manipulate, move or delete.

Some of other tools included in Director 7.0 are :

- Eraser tool – to erase image in the window.
- Hand tool – to move artwork around in the paint window.
- Zoom tool – Allow the image to be zoomed in as much as 800% of the actual image size.
- Eyedropper tool – to select a colour in the paint window to use as the foreground colour.
- Paint Bucket tool – enable user to fill an area with selected foreground colour.
- Text tool – allow text to be painted on a bitmap member.
- Pencil tool – is used to draw one pixel at a time. Pixel editing is a must for creating precise graphics to be displayed on the computer screen.

5.6 Text Members

Text members are used widely in this package especially in the storytelling module. One of the powerful new features in Director 7 is the capability of the text members to be edited.

Text members are complex, involving lots of options and features. However, to create one is very easy that is by selecting the text tool in the tool pallete and click the stage. This creates a text cast member and at the same time places that member on the stage.

5.6.1 Text Editing

Text can be edited in the text window. A simple toolbar will appear which shows the tools to change the font, size, style, alignment, line spacing and kerning of any selection.

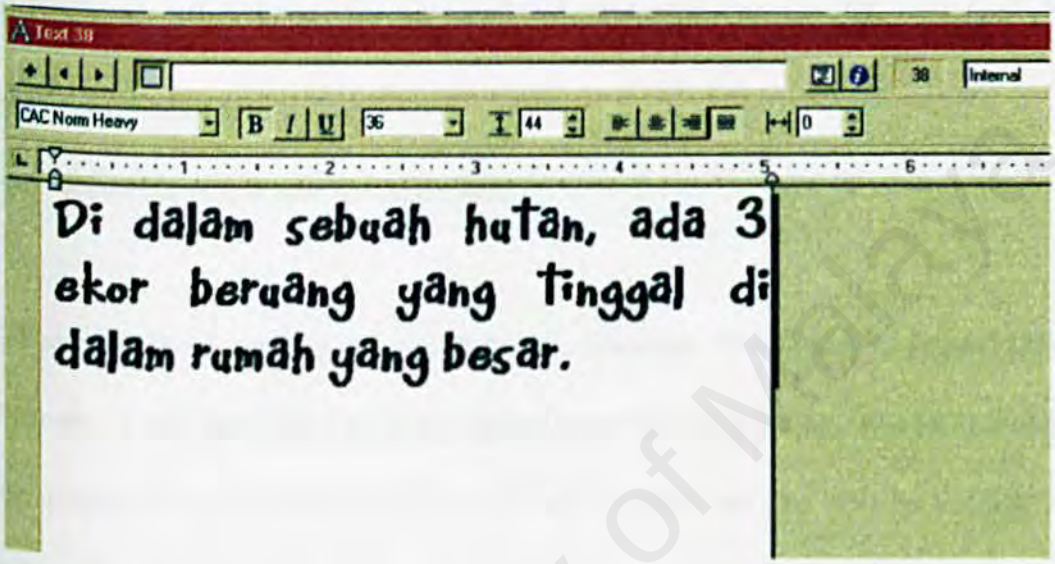

Figure 5.4 Text Window

5.7 Sound members

Sounds are impotant to enhance the storytelling module. It would be more interesting to have a narrator read the book to the children instead of having them to read it themselves. Other reason to include sound in the movie is to keep them interested and to make it more enjoyable.

Sounds can be small button feedback noises, background music, audio narration, animation soundtracks, special effects and many more.

Like images, sound files come in a variety of formats. Director can import a large number of these formats. Inside each sound file the sound is represented in a variety of different rates and bit depths.

Some of the sound formats are :

- AIFF – The Audio Interchange File Format. It is used widely on Macs and in the digital music recording industry.
- .wav – wave file is a window file format.

There are three ways to use sound files in Director. The first is to import them as cast members and drag the cast to the sound channel in the Score. The second way is to use sound files as external files. And lastly, sound file can also be created as Shockwave files.

Sound can also be controlled using Lingo Scripting to stop it from playing, or to set the volume lower during the playback. For example, in the hide and seek module, the background sound has to be set to lower volume so that the narrator's voice can be heard clearly.

```
on enterframe
  set the volume of sound 2 to 150
end
```

The scripting will set the volume played in sound channel 2 to 150 on entering the frame (the maximum volume is 256).

During the playback, if the user wish to jump to another movie while the movie is playing, there will be a slight problem with the sound because the sound will keep on playing until it reaches the end of the frame. This means that, the current sound playing will continue playing in the new movie, overlapping with the new sound in the new movie. To overcome this problem, on each of the navigation button, a script should be placed on the button, telling it to mute the current sound when the user clicks the button.

```
on mouseUp
  go to movie "cari saya4"
  puppetsound 1,0
end
```

5.8 Summary

Lingo scripting is the programming language of Director. It is a way of speaking to the computer by giving it commands and asking it questions. With Lingo scripting, so many fascinating things can be done to implement what we have in mind.

Before starting a movie, bitmaps or images have to be imported into the cast member properties. These images can come in many formats such as GIF, JPEG or BMP. These bitmaps can be edited in paint window to change the way they look.

Text can also be manipulated in Director 7. Before using the text, it has to be imported as the cast member as well. There are many types of fonts, styles, and colours to use inside the movie.

Sounds play an important role in enhancing the educational CD-ROM. Sounds can be imported into Director with the same import function used for bitmaps and text. Like images, sound files come in a variety of formats such as AIFF and .wav for Windows.

5.9 Conclusion

Before writing the code, few things should be considered such as:

- Using the design aspects to suggest an implementation language. For Director, the only programming language used is the Lingo Scripting.
- Preserving the quality design attributes in the code.
- Using documentation within the programs and in external documents to explain the code's organization, data, control and function, as well as the design decision.
- Reuse of codes from other projects.
- Organizational standards and guidelines.
- Writing the code to make it reusable on future projects.

CHAPTER 6

SYSTEM TESTING

CHAPTER 6: SYSTEM TESTING

6.1 System testing

System testing is a critical element of software quality assurance. System testing is required to ensure the system runs according to its specifications and in line with the users' requirement and expectation. Testing is not the first place where faults finding occur but testing is focused on finding faults, and there are many ways to make the testing efforts more effective and efficient. (Pfleeger, 1998)

Failure of software may be the result of any of several reasons:

- The specification may be wrong or have missing requirement. The specification may not state exactly what the customer wants or needs.
- The specification may contain a requirement that is impossible to implement, given the prescribed hardware and software.
- The system design may contain a fault. Perhaps the database and query-language designs make it impossible to authorize users.
- The program design may contain a fault. The component descriptions may contain an access control algorithm that does not handle this case correctly.
- The program code may be wrong. It may implement the algorithm improperly or incompletely.

Fault identification is the process of determining what fault or faults caused the failure, and fault correction or removal is the process of making changes to the system so that the faults are removed. (Pfleeger, 1998)

6.2 Types of Testing

In developing a large system, testing usually involves several stages. In general three types of testing are performed. They are Unit Testing, Module Testing and Integration Testing. (Pfleeger, 1998)

6.2.1 Unit Testing

Unit testing, also known as module testing or component testing is the first stage in testing. Each program in component is tested on its own, isolated from the other components in the system. It verifies that the component functions properly with the types of input expected from studying the component's design.

Unit testing is done in a controlled environment whenever possible so that predetermined set of data to the component being tested can be feeded and observe what output actions and data are produced.

Unit testing is simplified when a module with high cohesion is designed. When only one function is addressed by a module, the number of test cases is reduced and errors can be more easily predicted and uncovered.

This process enables the developer to detect errors in coding and logical mistakes that are contained within the boundary of the module. Testing involving interactions between modules are initially avoided.

In this program, unit testing has been conducted by testing each button on every page to determine whether it worked as programmed. Since this package is meant for children, the buttons and icons used have to be presented in a very attractive way to let them understand what they see on screen. Each of these buttons are programmed few behaviours to react such as a sound may be heard when the user clicks the button, changes of the appearance and also movements when the user roll the mouse over on them. This is to give them some hints that the buttons are able to link them to another page.

Another kind of interactivity is the cursor behaviour. This is the easiest form of interactivity where a cursor changes its appearance for example from an arrow to an hourglasss when a user roll the mouse over on certain buttons or images.

In order to test whether all the buttons work properly, each of the buttons have to be tested on each page. This is to make sure that they will link the user to the right page.

6.2.2 Module Testing

Module testing is performed after completion of each system module such as story module and songs module. In module testing, each of the module is tested as an independent component.

6.2.3 Integration Testing

After the individual components tested are working correctly, then the next step is ensuring that the interfaces among the components are defined and handled properly. Integration testing is the process of verifying that the system components work together as described in the system and program design specifications. (Pfleeger, 1998)

There are four approaches that can be used during this testing phase: (Pfleeger, 1998)

- ***Bottom-up Integration***

This is the popular approach used for merging components to test the larger system and it is called bottom-up testing. Using this method, each component at the lowest level of the system hierarchy is tested individually first.

Then, the next components to be tested are those that call the previously tested ones. This approach is followed repeatedly until all components are included in the testing.

The bottom-up is useful when many of the low-level components are general-purpose utility routines that are invoked often by others, when the design is object-oriented or when the system is integrating a large number of stand-alone reused components.

This approach has been used in the integration testing where each module is tested without propagating the errors to other module. For example, the module for this system such as the hide and seek module and the storybook module is tested individually before being integrated as one system.

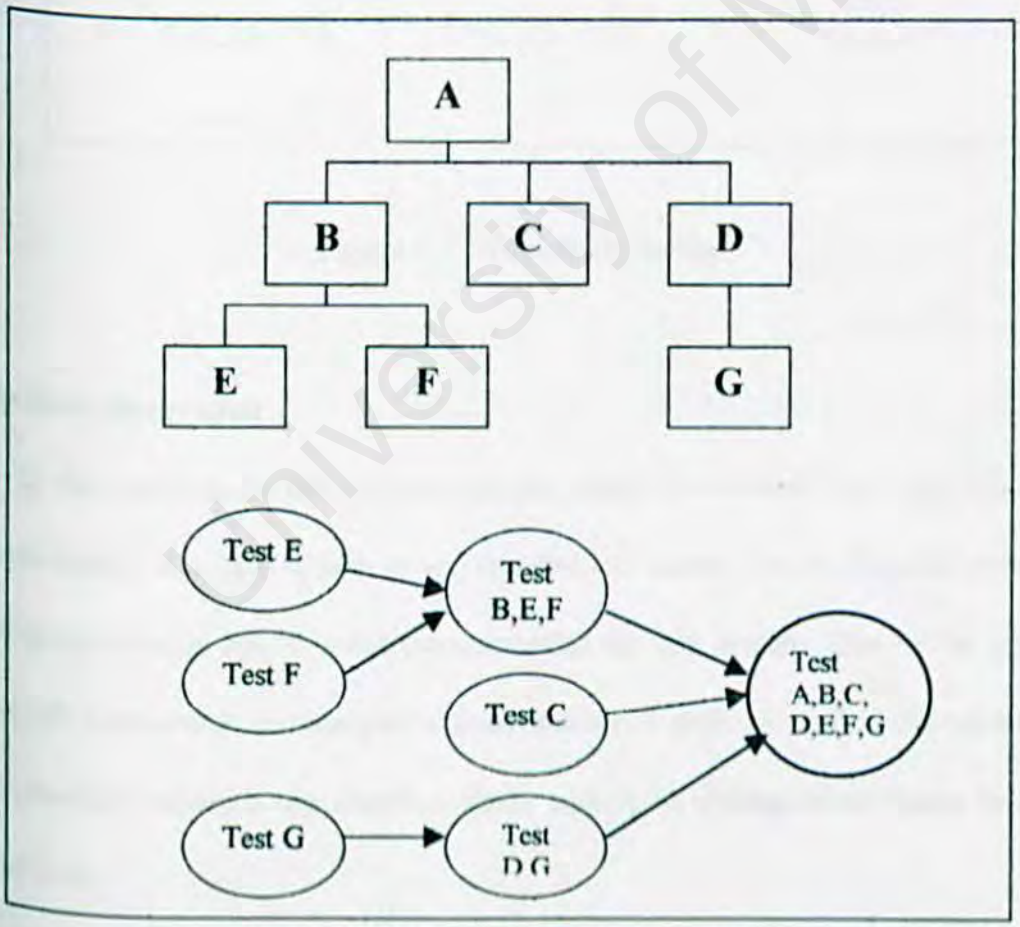

Figure 6.1 : Example of Bottom-up testing

- ***Top-Down Integration***

This approach is the reverse of bottom-up approach. In this method, the top level, usually one controlling component, is tested by itself. Then all components called by the tested component(s) are combined and tested as a larger unit. This approach is reapplied until all components are incorporated.

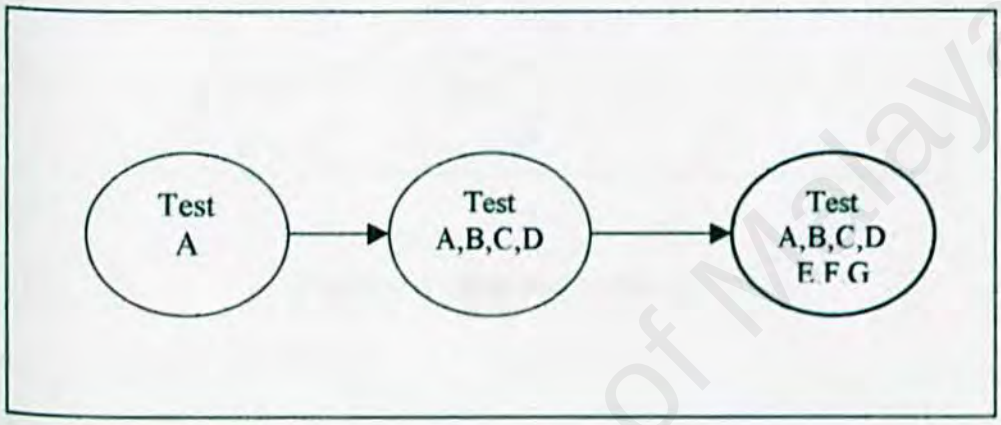

Figure 6.2 : Top-down testing

- ***Big-Bang Integration***

In this method, all the components are tested in isolation, and then they are all combined to test as a final system to see whether the system works. But this method has several disadvantages and it is not recommended for any system. One of the reasons is because all components are merged at once making it difficult to find the cause of any failure. Another reason is the interface faults cannot be distinguished easily from other types of faults.

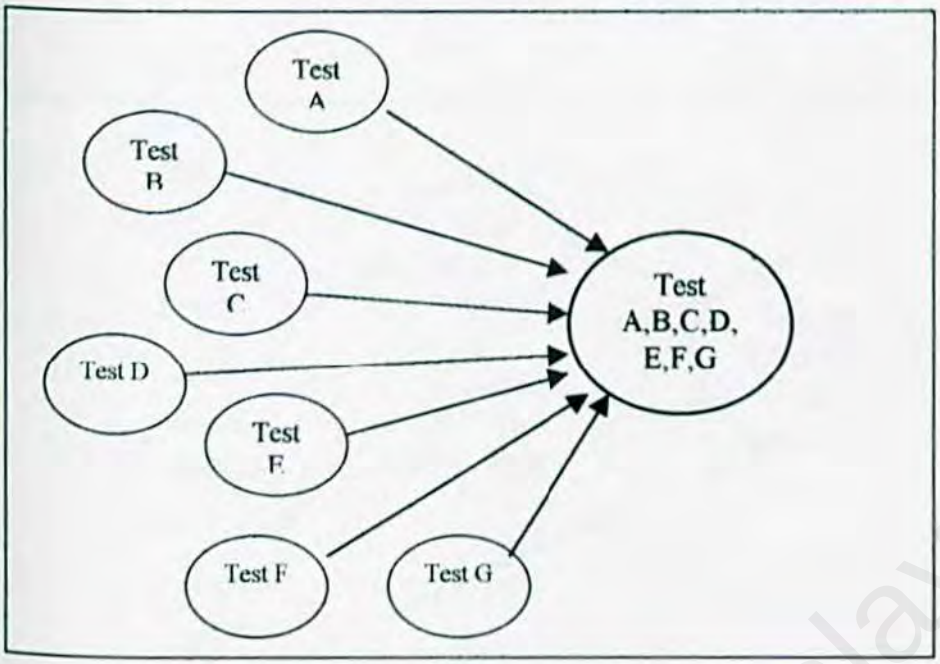

Figure 6.3 : Big-Bang testing

- ***Sandwich Integration***

Sandwich testing approach is the combination of bottom-up and top-down strategy. The system is viewed as three layers, just like a sandwich with the target layer in the middle, the levels above the target, and the levels below the target. A top-down approach is used in the top layer and a bottom-up one in the lower layer.

Sandwich testing allows integration testing to begin early in the testing process. It also combines the advantages of top-down with bottom-up by testing control and utilities from the very beginning. However it does not test the individual components thoroughly before integration.

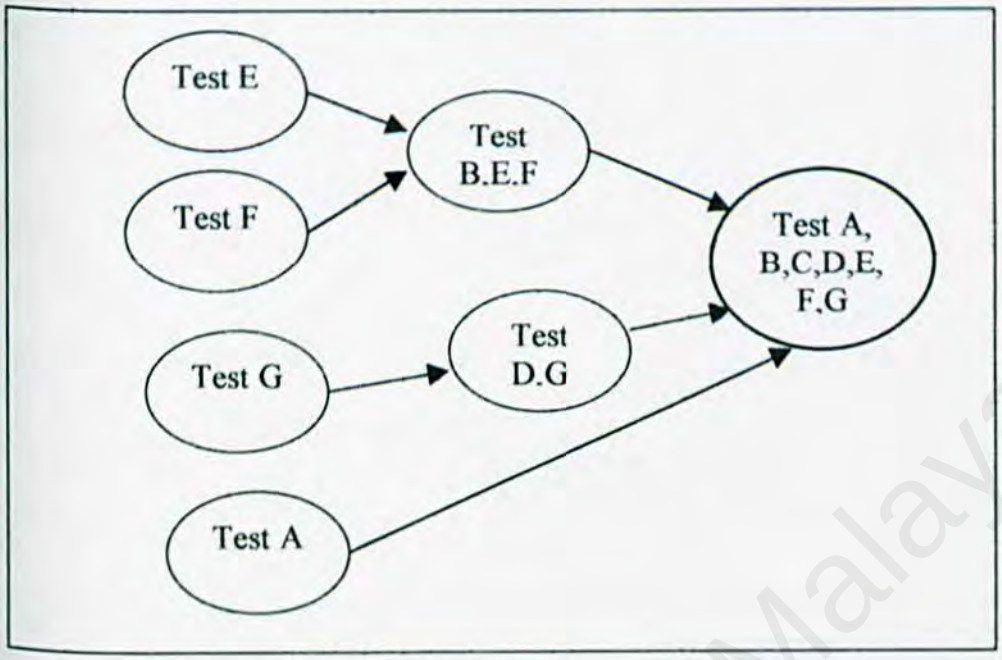

Figure 6.4 : Sandwich testing

6.3 Summary

System testing is required to ensure the system runs according to its specifications and in line with the users' requirement and expectation. There may be several reasons that caused software failure such as faults in the program design.

Testing phase is inclusive of three stages of testing which are unit testing, module testing, integration testing and system testing. Unit testing is the development activity that exercises each component seperately.

Integration testing puts components together in an organized way to help isolate faults as the combined components are tested together. Four approaches used in this stage of testing are bottom-up integration, top-down integration, big-bang integration and sandwich integration.

6.4 Conclusion

This chapter describes many techniques that can be used to test code components individually and as they are integrated. It is important to understand the difference between a fault and a failure.

The goal of testing is to find faults and not to prove correctness. Indeed the absence of faults does not guarantee correctness. There are many manual and automated techniques to assist faults finding in codes, as well as testing tools to know how much has been tested and to know when to stop testing.

CHAPTER 7

SYSTEM EVALUATION

CHAPTER 7 : SYSTEM EVALUATION

7.1 System Evaluation

System evaluation is the process of identifying system's strength and limitations and possible enhancements of this project. System is evaluated to show the effectiveness and efficiency of what has been done so far. It also highlights on the knowledge gained and some of the problems faced while developing the system and steps taken to overcome them.

The evaluation techniques used are similar to those in other disciplines where measurement of key aspects of the products, processes and resources has to be taken and the information gathered can be used to determine whether the goals have been achieved for productivity, performance, quality and other desirable attributes. (Pfleeger, 1998)

7.2 Approaches to Evaluation

There are four approaches that can be used as an evaluation technique:

- *Feature Analysis*

This is the simplest type of assessment used to rate and rank the attributes of various aspects. Feature analysis is necessarily very subjective and the ratings reflect the raters' biases.

- *Survey*

A survey is a retrospective study to try to document relationships and outcomes in a given situation. Surveys are often done in the social sciences where attitudes are polled to determine how a population feels about a particular set of issues. In this program, surveys are conducted to record data to determine how the user reacted to particular method, tool or technique. Example of surveys conducted are attached in the appendix.

- *Case study*

In a case study, key factors that may affect an activity's outcome are identified and then they are documented.

- *Formal experiment*

In a formal experiment, values of independent variables are manipulated, and changes in dependent variables are being observed to determine how the changes in the input affect changes in the output.

7.3 Project Problems and Solutions

During the implementation of this project, various problems have been encountered in few aspects including problems in hardware, software and also resources. All the problems faced have to be tackled properly in order to complete the project successfully.

- ***Large size of the multimedia file***

In Director, all the graphics imported are mostly bitmaps and animated images. Bitmaps images are often larger than any other images and in Director 7, bitmap is the only image file imported that can be edited in the paint window. And since this package is meant for children, I have to incorporate as much images as I can to make it appear attractive. Additionally, sound files also use a large amount of space capacity. The size of the files keeps getting larger as more sounds and graphics are being imported into the movie. It is impossible to use normal 1.44MB floppy disk as backup files.

Solution:

For sound files, especially in the songs module where it consists of seven songs, not including the minus one files which added up to double the amount of size, I have managed to reduce the total memory space needed by recording the sound in lower bit samples. The original audio CD comes in 44,100 Hz, 16 bit Stereo sound. But to record the songs in this rate will take up as much as 40MB for one song. So the only way to reduce the large size is to record it using 11,025 Hz with 8 bit Mono sound which remarkably reduced the song file to only 2MB. Even though by doing so has degraded the quality of the sound, but it is the only practical way to reduce the file size and to improve the performance.

For images, there are not many options but to reduce the file size in image editing software such as Adobe Photoshop. Director imports JPEGs and GIFs in their native

format and these files are smaller than bitmaps files but they are not editable in Director. However, to keep using these files in order to minimize space, the image must be edited in an external application such as Photoshop and re-imported the changed file.

Another option is to import the bitmap file as 8-bit image wherever possible. An 8-bit image draws faster than a 16- or 32-bit image because the computer can process the smaller image faster than a larger one. However, if the movie requires better color, I still have to import it using higher setting.

To make backups, all the files needed have to be copied into another computer. The backup files are updated once a week. Backup is very important as one cannot predict what might happen during the development of the program such as virus infection.

- ***Hardware limitations***

This package is developed using a computer with 48MB of RAM and 2.0GB of hard disk space which is quite inefficient to develop a multimedia program that uses a lot of memory space. With all the sounds and images imported, the speed gradually becomes very slow. It is quite a frustrating experience to deal with but there are no other options.

Solution:

The only solution to this is to keep the files small and minimize the amount of memory used as much as I can. For example, all the sprites dragged into the score have to be kept short because the longer the score, the more memory it takes and the longer it takes to download.

- ***Difficulty in editing images***

Most of the images scanned and imported have to be edited in either Photoshop or in Director itself. Most of the time has been spent in editing the images such as cropping only the particular parts wanted in the image. This is a very tedious task and it consumed a lot of time.

Solution :

Utilize the graphics tools such as Paint and Photoshop. It is easier when you master every tool provided in the editing software. The tasks are less complex once you make full use of the tools given. All it needs is just some time to explore and learn what the tools can do in order to make things simpler.

- ***Undo can be done only once***

One of the weaknesses I found in using Director is that once the operation has been done, there is no way the user can undo it back unless it was the last operation done.

Director restricted the users to perform undo operation only once, unlike Photoshop that has its History windows. You can always go back to the original image even though you have made several changes to the original image.

Solution :

It is unfair to actually compare Photoshop features with what Director can do because they are both two different programs with different purposes. Director is not an editing software, unlike Photoshop. To always be on the safe side, I edit most of the images in Photoshop. In fact, Photoshop has more features than Director so why not make full use of the editing software when the other could not carry out the task as well as Photoshop does.

- ***Lack of resources***

I think this is the major problem I faced in developing this software. Firstly, there are not many latest Director books in the university's library that can be referred to. Secondly, all the Macromedia books sold are very costly that restrain us from having many reference books.

Solution:

Made effort to search other libraries for Director books. Luckily a friend of mine managed to borrow two very good Director books from MIMOS's library for me to use. According to her, they have many latest books which can be borrowed (only by their

employees). In this matter, I wish the university could upgrade the books so that students like us could make full use of the library.

- ***Synchronizing Sound with Text animation***

Part of the major problem in developing the software is to synchronize the narrator's voice with the text animation. In the storytelling module, the coloured text should appear, highlighting the word as the narrator reads in order to train the children to learn the words in the story. To make this possible, each highlighted word has to be retyped and rearranged one-by-one on the stage. This is a very tedious task and consumed a lot of time. And the hardest part is to synchronize the voice with the highlighted word. The first time I tried, the voice came out first followed later with the text because the sound downloads faster than the score. The problem became worse when the user suddenly jumps into another page before the current page finishes.

Solution :

The only way to do this is by recording each and every word in separate file. This is what the other experienced developer told me but I think there should be an easier way because it is a very trivial task and knowing that Director can make anything possible, I tried searching for easier methods. Luckily I happened to read a similar problem that being featured in the Macromedia Tech Notes group discussion.

The solution is to use the Wait for Cue Point option in the Tempo dialog box to pause the playback head until a specified cue point in a sound or digital video is reached. Cue points can also trigger events to be interpreted by Lingo. With this I can use cue points to make text appear in time with narration.

To do this, I have to use Macromedia SoundEdit 16 to place cue points corresponding to the text in the sound file. In Director, the Tempo dialog box is used to pause the playback head at the frame where the corresponding text appears until the voice-over reaches the proper cue point.

But SoundEdit 16 works only on the Macintosh. For Windows, the only options are SoundForge 4.0 or Cool Edit 96. Similarly, WAV files with cue points added in SoundForge or CoolEdit work on both platforms.

- ***Limitations in fonts support***

Director have very limited font types. You have to import most of the fancy fonts to be used in the program. If the fonts used are not in the PC where you use the program, then it will replace the fonts with the default fonts in the sytem.

Solution:

Import the fonts as cast member in the movie.

7.4 System's Strength

Eventhough many problems occurred during the development of this project, somehow the system has its own strengths and specialities. Some of the strengths of the system are stressed here :

- ***Language used***

This package is developed in simple Bahasa Malaysia. There are many educational CD-ROM in the market but a large number of them are in English. Children who are not trained to speak english at an early age may have some problems in understanding the programs. Eventhough it is equally important to learn English, the children must also be taught correct Bahasa Malaysia at an early age.

- ***Windows platform***

Windows is the most popular and commonly used operating system in Malaysia even though the number of Macintosh users is growing. This package is developed to operate on Windows platform thus, it can be easily adapted to most PC's.

- ***User-friendly and attractive interface***

Since this package is developed with the children in mind, the interface has to be really attractive yet simple in order to capture their attention. To make it lively, sounds and colours play a big role in enhancing the interface. The buttons are replaced with pictures instead of normal text so that the youngsters can easily understand what they see on the screen. It is impractical to include unnecessary instructions in text format. The children like to see colourful things and hear variety of sound effects when action is performed.

Overall, from the evaluation form given to users, most of the respondents stated that this package is very easy to use and user-friendly.

- ***Multiple choice of activities***

Children are given three extra activities other than listening to the storybook. The additional activities such as colouring, songs module and hide and seek game are developed to allow the children enjoy to the fullest the contents in the CD-ROM. The game hide and seek is something different from the normal games we see on CD-ROM. Even though it is created in a very simple manner but it still adds up to the enjoyment.

Children who love singing will surely love the songs featured in the songs module. All the songs are the traditional kids' songs that have been passed on every generation such as Rasa Sayang and Nenek Bongkok 3. I have added an extra feature in

this module that is the Minus-one version of every song so that children who loves singing can listen to themselves singing along to the songs. This feature is rather similar to karaoke singing.

- ***No keyboard skill required***

Children are not required to use the keyboard because all the interactivity will only involves mouse click events. They only have to point or roll the mouse over certain objects and clicks the mouse to initiate the events.

- ***Provide Animation images, graphics and sounds***

All of the pages are filled with beautiful and colourful images and graphics suitable for children. In the hide and seek module, I imported the background sound so that it matches the theme such as the sound of the ocean complements the underwater theme.

In the storybook section, the interactivity imposed is something different from normal interaction between the children and the system. Even though the characters in the pictures does not animate much, but when the user roll the mouse over the picture, other features might appear such as the sound of Goldiloks snoring and the sound of her slurping the porridge.

7. 5 System's Limitations

- ***Low quality voice and audio***

Qualities of the voices recorded and the audio in the songs module developed are quite low compared to Audio CD. This is because the voice are not recorded in a sound proof studio which makes the sound filled with some noise. The audio in the songs module are recorded in lower sample rate which makes the quality not as good as the original sound.

- ***Lack of animation during the storytelling***

The images in the storybook module are not drawn which makes it rather impossible to animate most of the movements. But simple animation such as open-and-close mouth could be done. That is why I imposed other ways of interactivity such as sounds and simple animation.

- ***No highlighted text in the songs module***

It could be more interesting if every line sang in the song module could be highlighted so that it will be exactly like in the karaoke. It is actually possible to do it with Lingo. But due to time-constrain and lack of expertise in Lingo, the feature seem rather impossible to be done. This is firstly because the singer sings in a fast tempo that

makes it hard to put the cue in the correct places. And it also will take a lot of memory space as the score has to be strecthed according to the length of the song.

- ***Slow Loading speed***

The loading process is very slow since it is developed using a PC with 48MB of RAM. If this package is used on a PC with less memory than that, it could be slower which is not very pleasing.

- ***No repeat button***

During the story telling, the children could not hear the narrator reading the same page again, they can only go to the next page or return to the previous page. There is no repeat button where they can hear the same page being read again.

7.6 Future Enhancement

This package could be enhanced in order to give the best to the children. There are a lot of aspects which can be improved and to make it more interesting, more modules can be added to the package. To enhance the system performance in the future, many steps and features have to be considered as part of the enhancement. They are:

- Adding in other stories so that the children will have more choices on what story to listen to.

- Add more interactivity during the story telling.
- Provide a dictionary in order for them to look up for words which they don't understand.
- Add more activities which can develop their mind such as simple IQ test and keep their score in the database so that everytime they play, they can check on their progress.
- Adding other learning activities such as learning how to count and to identify objects and colours.
- Give them rewards when they completed each module successfully. Rewards can be a trip to a fantasyland where there will be songs with beautiful surroundings.
- Add more characters in the package that will be their host or tour guide during the storytelling and during other activities.
- Add more dialog and sounds to make it more interesting.

7.7 Knowledge and Experience gained

Through this project, I have learned so much from the very beginning until the completion of this project, learning itself is an on-going process. Everyday, I discovered new things and with new problems faced each day, it helps me find the solution and from every mistake, there will be lessons learned from it.

This is a very good experience and also great challenge, having to learn and discover new things on your own, and also in a very short time. It helps build self-

confidence and taught me a lot about time-management and self-discipline as well as being independent when you have to deal with everything yourselves.

Throughout the development of this project, I have learned a lot about Director 7 and also other editing tools such as Photoshop and Sound editing tool. It gives me the chance to learn Lingo Scripting, which is a very powerful scripting language used in Director. Director requires me to use both logic and imagination at the same time. It is a great tool for creating software. With Director, I can quickly bring my ideas into life because it is an environment that inspires new ideas as we explore it.

To start on a project, everything has to be planned ahead from deciding what software to use to testing and maintaining the system after it is completed. By documenting every step, it has trained me on how to plan a project and learn how to allocate the time needed properly. With proper documentation, all the things planned are made clear and my work is more organized.

To gather all the information needed, thorough research has been done through books, internet, library and other sources which helps me develop my skills in finding the right information and data.

All the time spent developing the package alone was not an easy task. It helps me learn how to cope with stress when deadlines are getting closer. With the support from my lecturer and friends, all these challenges can be overcome.

Director also comes with full-featured on-line help application which is a very useful tool. The online help is the quickest way for me to find out the details of the feature other than referring to books. I find the Director help files to be very informative, helpful and comprehensive.

In addition, a lot of infromation is available at Macromedia's Web site. It has a Tech Notes section that includes a varitey of helpful tips and tricks. When I have a problem on certain area in Director, this is the place I turned to and they are very helpful in answering whatever problems I was facing. You will get all the support that you need in here and you will know that you are not the first one to run into such kind of problems.

7.8 Summary

Chapter 7 is the part where evaluation on the completed system is made on the system's strength and limitations. The first part of the chapter explains about all the problems faced during the development of the package. The problems are followed by the solutions on how to overcome the problems. The problems could arise from hardware, scripting languages and external aspects such as lack of resources.

The system is later being evaluated on the limitations and weaknesses. Future enhancement is the part where suggestions and new ideas are put together as the first step ahead to improve what has been done. The experience and knowledge gained throughout the development of the system are later determined.

7.9 Conclusion

Intercative Storytelling Package for Children has finally been completed successfully. Although the objectives and scope are met and the system worked very well, there are still some limitations to the system. Overall, this package has its own strength and ability to capture children's interest and hopefully with this package, children and parents will realize that with multimedia, education can be more enjoyable and exciting.

The development does not end here even though the system is complete. There are still space for improvement in many aspects in order to make it really effective and are able to meet the market's demand. Hopefully, children and parents will have a new perspective towards eductaing their chidren in the new millenium.

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